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This periodical is published to inform air pollution personnel of the Environmental Protection Agency (EPA), and others, of technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given. Translations are cited with their sources whenever possible. The subject fields are as follow: Emission Sources; Control Methods; Measurement Methods; Air Quality Measurements; Atmospheric Interactions; Basic Science and Technology; Effects-Human Health; Effects-Plants and Livestock; Effects-Materials; Economic Aspects; Standards and Criteria; Legal and Administrative; Social Aspects; and General and Miscellaneous. All abstracts are listed under one of the above subject fields. A subject and author index are included. This issue contains abstracts 16350 - 17025.

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AIR POLLUTION ABSTRACTS

Vol. 3, No. 2 February 1972

Prepared by:
Air Pollution Technical Information Center (APTIC)
Research Triangle Park, North Carolina 27711

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INTRODUCTION

This periodical is published to inform air pollution personnel of the Environmental Protection Agency (EPA), and others, of technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given.

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The serial publications (journals, periodicals, etc.) which are regularly screened for input are listed with their publishers' addresses in one issue in each volume of our abstract bulletin; the most recent list appeared in the December 1971 issue.

As another service, abstracts of all of the literature in APTIC (not just in a single issue of this periodical) on any subject related to air pollution will be provided free of charge upon request. APTIC can search information more recent than that in the current issue of this periodical because of lapse of time entailed by editorial, make-up, and printing work. More than 1400 subject index terms are available for such searching—more than those included in the subject index in each issue.

SUBJECT FIELDS AND SCOPE NOTES

1. EMISSION SOURCES

Information pertaining to an industry, process, or material associated with air pollution. Documents in this category are concerned primarily with characteristics of a specific class of emission sources including types, rates, industries; secondary coverage may include effects, control methods, etc.

2. CONTROL METHODS

Includes equipment and both specific source control and general abatement efforts. Included are documents describing the operating principles, design, operation, efficiency, etc., of equipment and methods of removing pollutants. The scope of the document can vary from a device for a specific source to an approach applicable to an entire industry—e.g., automobiles.

3. MEASUREMENT METHODS

Includes equipment as well as methods. Confined to development, testing and evaluation of pollutant determination methods (sampling, analytical, monitoring) and equipment, as such. Data obtained by use of methods in specific applications are placed in the applicable subject categories.

4. AIR QUALITY MEASUREMENTS

Pollution measurements in the ambient air, generally related to specific geographical locations, such as area surveys. Also includes general reviews of area situations and emission source inventories.

5. ATMOSPHERIC INTERACTION

All chemical and physical phenomena occurring in the atmosphere. Included is material on dispersion, air pollution forecasts, meteorological effects, topographical effects, photochemical reactions in the atmosphere, etc. Laboratory studies of photochemical reactions are assigned to Basic Science and Technology.

6. BASIC SCIENCE AND TECHNOLOGY

General discussions or data compilations for the basic physical and chemical properties of pollutants. Theoretical and laboratory studies on related chemical and biological reactions and mechanisms. Mass transfer and other basic knowledge related to process engineering applications in emission control or abatement. Excludes photochemical studies in the atmosphere and biochemical studies related to effects of air pollution.

7. EFFECTS–HUMAN HEALTH

Covers medical and epedemiological studies; biological effects other than those on plants and livestock produced by air pollutants; laboratory animal experiments.

8. EFFECTS–PLANTS AND LIVESTOCK

Effects on vegetation–crops, trees, other plants–and on livestock as distinguished from laboratory experimental animals.

9. EFFECTS–MATERIALS

Deterioration, corrosion, etc., of physical materials, buildings, and structures.

10. ECONOMIC ASPECTS

Economic implications of air pollution and its control, e.g., economic losses from pollution damage, and costs of control programs or equipment in general.

11. STANDARDS AND CRITERIA

Recommended or adopted guides, criteria and standards for allowable emission limits or pollutant concentrations, air quality, equipment characteristics, and fuels.

12. LEGAL AND ADMINISTRATIVE

Legal aspects include legislation, ordinances, rules, litigation, hearings, decisions, etc. Administration covers administrative and miscellaneous information concerning control agencies and control and research programs. Typical topics are personnel, budgets, contractural activities and program descriptions.

13. SOCIAL ASPECTS

Sociological and psychological aspects such as social attitudes, public opinion studies, public relations, and public information.

14. GENERAL AND MISCELLANEOUS

Reviews of general problems, trends and background. Documents not assignable to other categories.

ABSTRACT BULLETIN

EMISSION SOURCES

16350 APTIC NO. 34312

RAILROAD TRAFFIC AND ENVIRONMENTAL POLLUTION. *(Schienenverkehr und Umweltschutz). Text in German. VDI (Ver. Deut. Ingr.) Nachr. (Berlin), 25(33):4, Aug 18, 1971.*

While the number of smoke- and soot-emitting steam engines has decreased to about 100 from 10,000 twenty years ago, diesel engines have increased in number to 5100 from 1300. Steam engines burned approximately 10 million tons of coal annually, and the environmental pollution was considerable. Although diesel engine emissions are not negligible, they amount to only five percent of automobile emissions. In addition to engine emissions, the railroads must also monitor power plant pollutants and combustion products from their other operations.

16351 APTIC NO. 34348

Study Group on Air Pollution by Fluorides (Japan)

ABSTRACTS OF SCIENTIFIC PAPERS ON AIR POLLUTION BY FLUORIDES. (I) SOURCE OF POLLUTANTS, EFFECT ON PLANTS AND MEASURING METHOD. *(Fukkabutsu ni yoru taiki osen boshi ni kansuru kenkyu bunken shoroku shu (I) Hasseigen, shokubutsu eikyo, sokutei ho). Text in Japanese. 62p., April 1970. 98 refs.*

Abstracts are presented of literature pertaining to the sources of fluorides, their effects on plants, and methods of measurement. Colorimetric methods, fluorescence, electroconductivity analyzers and continuous monitoring are included. Plant growth environments and maximum fluorine concentrations are indicated.

16352 APTIC NO. 34425

WASTE HEAT UTILIZATION IN AUSTRALIA. *Gas Oil Power, 67(720):213, Sept./Oct. 1971.*

Diesel installations in Australia are generating steam for heavy fuel heating, seawater distillation, drying of nickel concentrates, and ore-slurry flotation processes. The exhaust gas put to use is usually 316-427 C and is passed through waste heat boilers for generation of low-pressure steam. The temperature of the coolant liquid can be exploited for heating boiler feed water or heating heavy fuel prior to combustion in the diesels. The desalination plant provides some 400,000 gallons of potable water/day. At the concentrates drying plant, the use of diesel exhaust makes it unnecessary to burn fuel for air heating.

16353 APTIC NO. 34532

TRADITIONAL HAZARDS FOUGHT AT GAS PLANTS. *Oilweek (Calgary, Can.), 22(39):36-42, Nov. 15, 1971.*

Natural gas processing plants produce air, water, soil, and odor pollution hazards. These hazards are, for the most part, totally controlled because of a multi-million dollar effort on the part of the industry. Substantial sums are spent on soil neutralization and fertilization programs to offset the effect of stockpile sulfur dust on soil. In addition, the industry is now beginning to stockpile sulfur in chips or small chunks instead of in a rock-hard pile. This system, called slating, reduces windborne sulfur dust by 70% or more. Hydrogen sulfide in tail gas is converted to more acceptable sulfur dioxide by incinerating the tail gas with sweet gas and excess air. The incineration process takes place at extremely high temperatures to ensure complete combustion and to provide for maximum thermal rise. As a result, stack gas from processing plants rises to a 1000-ft minimum and a 4000-ft maximum from the top of the stack. Many companies monitor stack emissions to make certain that only acceptable trace levels are discharged, and considerable effort is devoted to extracting greater percentages of sulfur from field gas. Improvements in sulfur recovery systems have already yielded a significant reduction in SO2 emissions. Most plants with severe water-waste problems use two or three separation units as a primary treatment stage, followed by chemical treatment and discharge to lagoons, where the water is often aerated to make up for abnormal biochemical oxygen demand. Caustic gas cleaning systems giving rise to odorous sodium mercaptide are being replaced by dry treatment with molecular sieves or dry dessicent dehydrators. Material collected in the sieves or dessicants can be driven off by heat as a vapor that can be efficiently burned or flared off.

16354 APTIC NO. 34666

Airesearch Mfg. Co. of Arizona, Engineering Staff

TEST REPORT. EXHAUST EMISSIONS TEST - AIRESEARCH AIRCRAFT PROPULSION AND AUXILIARY POWER GAS TURBINE ENGINES. *Office of Air Programs Contract 68-04-0022, Rept. GT-8747-R, 371p., Sept. 10, 1971.*

NTIS: PB 204920

Exhaust emission test results for gas turbine aircraft engines are presented. The results are expressed as plots of the respective emission indices for total hydrocarbons, carbon monoxide, carbon dioxide, and total nitrogen oxides (expressed as nitrogen dioxide) as a function of equivalence ratio, defined as the actual fuel-air ratio at the operating condition to the stoichoimetric fuel-air ratio for the fuel used. Exhaust emission test results varied greatly for several engines tested, suggesting the need for additional comparison studies. Complete data on test engineering, operating conditions, and test results are presented. Engine cycles were also studied.

16355 APTIC NO. 34785

Committee on Public Works (U. S. Senate)

SOME ENVIRONMENTAL IMPLICATIONS OF NATIONAL FUELS POLICIES. *91st Congress (Senate), 2nd Session, 70p., Dec. 1970. 32 refs.*

An objective analysis is presented of the factors relevant to the development of fuels and energy policies compatible with environmental quality requirements. Population figures, energy consumption, fuel consumption, fuel reserves, and electric power capacity requirements are considered. Pollutants emitted from fossil fuel combustion are indicated. Fuel substitution, low-sulfur content fuels, desulfurization of coal and oil, fuel switching, and post-combustion pollutant removal are discussed. Alternatives for increasing gas reserves include pipeline imports of North American gas, importation of liquefied natural gas, synthetic gas by coal gasification, synthetic gas from oil shale, stimulation of existing gas reservoirs, and natural gas from Alaskan resources. Alternatives for increasing crude oil reserves are also considered. Advanced techniques for power production include fuel cell power generation, magnetohydrodynamic power generation, nuclear fusion reactors, and nuclear breeder reactors. Expenditures on pollution research, development, and demonstration are tabulated. Federal programs related to the environment are discussed.

16356 APTIC NO. 34825

National Transporation Safety Board, Washington, D. C., Bureau of Surface Transporation Safety

RAILROAD ACCIDENT REPORT. CHICAGO, BURLINGTON, AND QUINCY RAILROAD COMPANY TRAIN 64 AND TRAIN 824 DERAILMENT AND COLLISION WITH TANK CAR EXPLOSION, CRETE, NEBRASKA, FEBRUARY 18, 1969. *Rept. NTSB-RAR-71-2, 82p., Feb. 24, 1971.*

NTIS: PB 198790

A train accident is reported in which one consequence was the complete fracture of a tank car and release of its load of 29,200 gallons of anhydrous ammonia into the atmosphere. A gas cloud was formed which blanketed the surrounding area for a considerable time because of prevailing weather conditions. All persons directly exposed to the cloud of ammonia gas received either fatal (six people) or serious (53 people) chemical injury to the respiratory tract; people within the area of the gas concentration who remained in their homes or who had adequate protection escaped with little or no injury. The causes of the complete failure of the tank car following derailment were heavy impact with another car and the brittleness of the tank car steel at the ambient temperature of four F. More than 11,000 tank cars of this type are in service, most carrying liquefied petroleum gas. In low-temperature conditions, the consequences of accidents involving some large LPG cars are most likely to be catastrophic than in warm weather. The failure to thoroughly test tank cars for such hazards as flammability and brittleness before they are put in service is both false economy and an injustice to persons living along the tracks. Thorough study of tank car materials and of methods for rapid dispersion or absorption of clouds of toxic vapors is recommended.

16357 APTIC NO. 34915

Bureau of Census, Washington, D. C.

PRODUCT CLASSES - QUANTITY AND VALUE SHIPPED BY ALL MANUFACTURING ESTABLISHMENTS: 1947, 1954, 1958, 1963 TO 1967. *In: Abrasive, Asbestos, and Miscellaneous Nonmetallic Mineral Products. p. 32E-28, Sept. 1970.*

The quantity and value shipped by all manufacturing establishments of abrasive, asbestos, and miscellaneous nonmetallic mineral products are indicated for 1947, 1954, 1958, and 1963 to 1967. These figures represent estimates derived from a representative sample of manufacturing establishments canvassed in the annual survey of manufacturers.

16358 APTIC NO. 34916

Bureau of Census, Washington, D. C.

PRODUCT CLASSES - VALUE SHIPPED BY ALL MANUFACTURING ESTABLISHMENTS: 1947, 1954, 1958, 1963 TO 1967. *In: Smelting and Refining of Nonferrous Metals and Alloys. p. 33C-29, 1970.*

Quantities shipped by all manufacturing establishments of copper, lead, zinc, aluminum, primary nonferrous metals, and secondary nonferrous metals are tabulated for 1947, 1954, 1958, and 1963 to 1967. Both smelter and refined materials are included.

16359 APTIC NO. 34917

Bureau of Census, Washington, D. C.

MATERIALS CONSUMED, BY KIND: 1967 AND 1963. *In: Forging and Miscellaneous Primary Metal Products. p. 33E-17, 33E-18, 1970.*

The value shipped by all manufacturing establishments of iron and steel forgings, metal powders and pastes, and miscellaneous primary metal products is tabulated for 1947, 1954, 1958, and 1963 to 1967. Materials consumed in the production of forgings and these miscellaneous products are listed for 1963 and 1967.

16360 APTIC NO. 34918

Bureau of Census, Washington, D. C.

MATERIALS CONSUMED, BY KIND: 1967 AND 1963. *In: Abrasive, Asbestos, and Miscellaneous Nonmetallic Metal Products. p. 32E-29, Sept. 1970.*

The quantity consumed of material components for the production of abrasives, asbestos, and miscellaneous nonmetallic mineral products is tabulated for 1963 and 1967. Delivered costs are also listed.

16361 APTIC NO. 34919

Bureau of Census, Washington, D. C.

FUELS AND ELECTRIC ENERGY CONSUMED: 1967. *In: Smelting and Refining of Nonferrous Metals and Alloys. p. 33C-32, 1970.*

The quantity of fuels consumed in the smelting and refining of nonferrous metals and alloys for 1967 has been tabulated. The cost of purchased fuels and electric energy is also indicated. This includes coal, coke, fuel oil, fuel gases, and other fuels such as gasoline.

16362 APTIC NO. 34921

Bureau of Census, Washington, D. C.

MATERIALS CONSUMED, BY KIND: 1967 AND 1963. *In: Smelting and Refining of Nonferrous Metals and Alloys. p. 33C-31, 1970.*

The quantity consumed in the smelting and refining of nonferrous metals and alloys of aluminum ingot, aluminum and aluminum-base alloy scrap, copper, lead, zinc, and tin is listed for 1963 and 1967. Delivered costs are also indicated.

16363 APTIC NO. 34922

Bureau of Census, Washington, D. C.

FUELS AND ELECTRIC ENERGY CONSUMED: 1967. *In: Abrasive, Asbestos, and Miscellaneous Nonmetallic Mineral Products. p. 32E-30, Sept. 1970.*

The costs of fuels and electric energy consumed in the use of abrasive, asbestos, and nonmetallic mineral products are discussed for 1967.

16364 APTIC NO. 34954

Working Group on Pesticides, Washington, D. C.

INFORMATION AVAILABLE ON DISPOSAL OF SURPLUS PESTICIDES, EMPTY CONTAINERS AND EMERGENCY SITUATIONS. *Rept. WGP-DR-3, 58p., Sept. 1970. 103 refs.*

NTIS: PB 197146

Current research, recommendations, and problem areas are reported for disposal and handling of surplus pesticides and empty containers; detoxification, handling, reconditioning, and reuse of empty 55-gallon pesticide drums; storage and handling of pesticides and empty containers; detoxification or decontamination of equipment, and disposal and handling of pesticides or wastes resulting from accidents; and emergency assistance. Sources of wastes, definitions for various disposal methods, estimates of numbers of empty containers, and manufacturers of incinerators and flue gas scrubbers are also given.

16365 APTIC NO. 35023

RETURN OF THE STEAM CAR. *Del. Valley Ind., 44(9):15, Oct. 1971.*

The steam engine as a power source for automobiles is discussed. The engine would operate as efficiently as an internal combustion engine while simultaneously decreasing engine exhausts by about 96%. The basic design and operating costs of the steam engine are described.

16366 APTIC NO. 34766

Aaronson, Allen E. and Richard A. Matula

DIESEL ODOR AND THE FORMATION OF AROMATIC HYDROCARBONS DURING THE HETEROGENEOUS COMBUSTION OF PURE CETANE IN A SINGLE-CYLINDER DIESEL ENGINE. *Combustion Inst., Pittsburgh, Pa., Symp. (Int.) Combust., (Proc.), 13th, Salt Lake City, Utah, 1970, p. 471-481, 1971. 13 refs. (Aug. 23-29.)*

Experimental facilities and methods, based on combined gas chromatographic and mass spectrometric techniques, are examined for the qualitative analysis of odoriferous and carcinogenic compounds formed during the heterogeneous combustion of pure hydrocarbon. Exhaust gas samples from a diesel engine operating on a lean pure cetane-air mixture were analyzed for saturated and unsaturated aldehydes, alcohols, acids, homo and heterocyclic compounds, and aromatic compounds. The diesel odor problem and potential biological activity of diesel exhaust were examined. The pyrolysis and partial oxidation of lubricating oil blowby enhanced the production of aromatic hydrocarbons. (Author abstract modified)

16367 APTIC NO. 34367

Amberg, A. A. and B. J. Butler

HIGH-SPEED PHOTOGRAPHY AS A TOOL FOR SPRAY-DROPLET ANALYSIS. *Trans. ASAE (Am. Soc. Agr. Engrs.), 13(5):541-546, Sept./Oct. 1970. 16 refs. (Presented at the Annual Meeting of the American Society of Agricultural Engineers, Lafayette, Indiana, June 1960. Paper 69-140.)*

Because of the hazards associated with pesticide and fertilizer drift, a stroboscopic high-speed photographic technique was developed to analyze the formation of driftable and nondriftable droplets near the orifice of an agricultural spray nozzle. The general trial procedure consisted of obtaining, developing, and arranging photographic and optical equipment in various combinations and configurations; running photographic trial tests; and developing a simplified data-reduction technique. The best results were obtained by setting up a movie camera with its line of vision perpendicular to the flat surface of a spray issuing from a fan-spray nozzle and placing a sheet of frosted cronar (for flash diffusion) halfway between the spray and the illumination apparatus, a stroboscope with a repetitive frequency of 110 to 150,000 flashes/min. Representative film strips of water and viscosity modifiers issuing from the nozzle at five and 20 psig are shown and analyzed. The viscosity modifiers were commercial products used in pesticide-spray solutions to eliminate or reduce drift. Droplet-forming phenomena are clearly visible in the photographs.

16368 APTIC NO. 34898

Aronson, Robert R.

STATEMENT ON ELECTRIC BUS TECHNOLOGY. *Mitre Corp., McLean, Va., Proc. Bus Technol. Symp., McLean, Va., 1970, p. 60-71. (Jan. 23.)*

NTIS: PB 198619

An electric car was built by converting a gasoline car. Then forty additional electric cars were built in 1968 utilizing a tri-polar, lead-cobalt battery. A new, sealed energy cell was developed with 33% greater capacity than the previous battery. Solid state controllers and miniature fast chargers were designed and developed. Considerable work has been done on design parameters of a 21-passenger bus which would utilize a multi-purpose electric vehicle chassis.

16369 APTIC NO. 34774

Baba, Arimasa

AIR POLLUTION AND FUEL. *(Taiki osen to nenryo). Text in Japanese. Naika, 21(5):810-812, May 1968.*

Air pollution due to imperfect combustion of fuels is examined. Soot, containing 80.0-92.4% carbon and 20-1.6% hydrogen, forms when the air supply is not sufficient for burning the fuel at a high temperature. Highly volatile fuel creates less soot because it mixes well with the air and combustion is quick. A new type of coal fuel is being developed by treating coal at less than 450 C and forming it into a shape and size that would facilitate ventilation and prevent fly ash. Common fuels in the order of least soot production include city gas; natural gas (methane); propane (liquid petroleum gas) kerosene; anthracite; coke; heavy oil; volatile bituminous coal; tar; city dusts and solid waste. Japanese coal contain less than 1% combustible sulfur; the raw oil, used in Japan before the war, also had very little sulfur content. Oil imported from the Near and Middle East contains around 2% sulfur. Sulfur dioxide, influenced by many factors, and turns into sulfur trioxide photochemically or by the catalytic action of suspended particulates. Sulfur dioxide and SO3 in smoke can be cleansed by liquid absorbent, or treated by manganese oxide, lime, activated coal, or ammonia; the most effective SO2 control method would be to import heavy oil with minimal sulfur content. Automobile exhaust gas contains carbon gas, water, carbon monoxide, aldehyde, tar-like hydrocarbons and nitrogen oxides. Ideal gasoline would contain mostly isoparaffin, without tetraethyl lead CO and would have a high octane value. Diesel engines emit less than 0.1% but create much soot.

16370 APTIC NO. 34899

Bee, Robert W.

PROCEEDINGS OF THE BUS TECHNOLOGY SYMPOSIUM, 23 JANUARY 1970. *Mitre Corp., McLean, Va., Proc. Bus Technol. Symp., McLean, Va., 1970, 87p. 9 refs. (Jan. 23.)*

NTIS: PB 198619

A description is presented of the proceedings of the Bus Technology Symposium in order to identify innovations that would have widespread application in center city transportation. Technological alternatives in the area of low emission propulsion were given by describing the characteristics of the various systems. Performance features, operating characteristics, and state of development of several of these systems were emphasized. Diesel engines, Rankine cycle engines, Stirling cycle engines, and Brayton cycle-gas turbines are mentioned, as well as hybrid electric systems. Other papers in the proceedings considered electric propelled vehicles in greater depth, the conversion of a standard bus to operate on liquefied natural gas, Mr. Lear's steam bus, and the Minibus concept.

16371 APTIC NO. 34583

Beedgen, Otto

ENVIRONMENTAL PROTECTION AND THE OIL AND GAS HEATING SYSTEMS. *(Umweltschutz und die Oel- und Gasfeuerung). Text in German. Sanit. Heizungstech., 36(10):743-752, Oct. 1971.*

During the combustion of gases for heating purposes waste gases develop which contain carbon dioxide, water, nitrogen, oxygen, oxides of nitrogen, hydrocarbons, and carbon monoxide. Liquid fuels produce waste gases of CO2, H20, N2, 02, the oxides of nitrogen, hydrocarbons, sulfur dioxide, and

CO at incomplete combustion. The Federal Republic of Germany still has 30 million individual home heaters which are heated with solid fuels. But this number is declining; new apartment buildings and homes are now equipped with oil or gas heating systems. Before such a system is operated, measurements of the heating chamber, temperature of the flue gas, the CO content, the CO2 content, the 02 content, the soot number, the draft or pressure in the combustion chamber, and the stack draft are required. For CO2 measurement, simple units are available which are filled with potassium lye as an absorbent. The CO content is measured with a gas analyzer and test tube. According to emission standards, a CO content of 0.1% may not be exceeded. For determination of the soot content, the filter paper method by Bacharach is used. The effects of the waste gas components on man are discussed.

16372 APTIC NO. 34908

Bocharov, A. P. and E. Yu. Terpilovsk

STUDY OF THE ACTION OF MACHINE-TRACTOR UNITS ON THE UPPER SOIL LAYER. *(Issledovanie vozdeistviya mashinno-traktornykh agregatov na verkhnii sloi pochvy). Electrif. Mech. Soc. Agric. (USSR), no.8:11-14, 1970. 8 refs. Translated from Russian by William R. Gill. National Tillage Machinery Lab., Auburn, Ala., 9p., Dec. 1, 1970.*

NTIS: PB 198447

In recent years the main agricultural regions of Kazakhstan and western Siberia, USSR, have introduced a new technology developed for grain crops to protect the soil against the effects of wind. To implement this technology, sets of anti-erosion machines have been produced for use with 3-5 ton tractors which operate at speeds of 6-10 km/hr. Field tests were conducted to determine the variation of conditions of the field surface with an increase of the working speed of machine-tractor units. An increased speed of the units on soils subjected to wind erosion in most cases causes decreased wind stability of the field surface, due to a decreased amount of straw and the pulverization of soil particles. The movement of the equipment converts these particles into a cloud of suspended dust carried by the wind. (Author conclusions modified)

16373 APTIC NO. 34848

Boettner, E. A. and Gwendolyn L. Ball

COMBUSTION PRODUCTS FROM THE INCINERATION OF PLASTICS. *Preprint, American Inst. of Chemical Engineers, New York, 15p., 1971. (Presented at the American Institute of Chemical Engineers, National Meeting, 68th, Houston, Tex., Feb. 28-March 4, 1971.)*

Qualitative and quantitative analysis of the combustion products of various plastics can aid in identifying compounds which present air pollution or equipment corrosion problems as well as those compounds potentially recoverable for their fuel or crude chemical value. Oxygen supply and flow rate are varied in studying the combustion products of each of five plastics. At 250 C polyvinyl chloride begins to break down and releases its chlorine nearly quantitatively as hydrogen chloride. A plastic giving potential pollution and corrosion problems similar to PVC is polysulfone, a self-extinguishing thermoplastic used in small appliances, electronic parts, automobiles, and aircraft. Thermogravimetric analysis is also presented for the breakdown of polyimide, polyphenylene oxide, polycarbonate, and other plastics containing oxygen.

16374 APTIC NO. 34665

Bogdan, Leonard and H. T. McAdams

ANALYSIS OF AIRCRAFT EXHAUST EMISSION MEASUREMENTS. *Cornell Aeronautical Lab., Inc., Buffalo, N. Y., Vehicle Research Dept. and Cornell Aeronautical Lab., Inc., Buffalo, N. Y., Systems Research Dept., Environmental Protection Agency Contract 68-04-0040, CAL-T R-NA-5007-K-1, 644p., Oct. 15, 1971. 7 refs.*

NTIS: PB 204879

The analytical procedures and data processing techniques used to translate field measurement data on aircraft exhaust emissions into a form consistent with the needs for the promulgation of realistic standards are reviewed. Pollutant mass emissions for carbon monoxide, hydrocarbons, and nitrogen oxides were computed for various aircraft operational cycles, specific engine power settings, and specified times in mode. Numerical results are tabulated for each individual engine together with summaries obtained by aggregating engine data on a model basis. Data are presented for turboprop/turbine engines, light-utility piston engines, and auxiliary power units. (Author abstract modified)

16375 APTIC NO. 34905

Bolt, J. A., S. J. Derezinski, and D. L. Harrington

THE INFLUENCE OF FUEL PROPERTIES ON METERING IN CARBURETORS. *Preprint, Society of Automotive Engineers, Inc., New York, 18p., 1971. 16 refs. (Presented at the Automotive Engineering Congress, Detroit, Mich., Jan. 11-15, 1971, Paper 710207.)*

The influence of the properties of gasolines and testing fluids on metering by carburetors is examined. The values of viscosity, specific gravity, and surface tension were different for each commercial gasoline and fluid and can significantly influence fuel matering by orifices. For a metering orifice, the change in fuel flow rate resulting from the variations is different for each geometry and pressure differential. Commercial gasolines vary in their carbon-hydrogen ratio from 6.1 to 6.8, resulting in a 2% variation in the stoichiometric air-fuel ratio. For most conventional carburetors operating in the low-load range, the air-fuel ratio becomes richer as the fuel temperature is decreased; the effect is maximum at idle. The appropriate choice of metering-orifice geometry can diminish the influence of fuel property variations. (Author conclusions modified)

16376 APTIC NO. 34739

Braverman, M. M., C. Theophil, F. Masciello, and C. Smith

THE CONTRIBUTION TO AIR POLLUTION BY PIGEONS. *J. Air Pollution Control Assoc., 12(12):570-571, Dec. 1962. 10 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 55th, Chicago, Ill., May 20-24, 1962.)*

The modified Folin method for uric acid was used to determine avian fecal matter in New York City air. Samples of suspended particulate matter were obtained with a high volume sampler by passing air through 11-cm filter paper for one hour. Details of the chemical analysis are given. Every sample analyzed showed amounts of uric acid. Based on the limited determinations made, every cubic meter of air contained about 0.16 microgram of uric acid. Since the average daily air intake is 15,000 quarts, about 3 micrograms are inspired daily. Pigeon excreta has recently been implicated as a carrier of pathogenic disease germs.

16377 APTIC NO. 34380

Burtz, Richard D.

EXTERNAL COMBUSTION ENGINE FEASIBILITY BUS. *Preprint, Dept. of Transportation, Washington, D. C., Urban Mass Transportation Administration, 11p., 1971. (Presented at the Steam Bus Symposium, Washington, D. C., Nov. 17, 1971.)*

The design and development of various external combustion engines is discussed. A steam system retrofitted to a Southern California Rapid Transit District standard city bus has been developed. Great effort has been made to improve efficiency, simplify operator control, improve maintenance, and offer better performance than former external combustion engine designs. Recent developments in burner technology have shown that the steam engine will be capable of surpassing the 1975 emissions standards by at least 10 times. Component description and specifications of the Steam Power Systems demonstration bus are presented.

16378 APTIC NO. 34561

Chesters, A. K.

PREDICTION OF THE EFFECT OF ENGINE GEOMETRY ON AIRCRAFT SMOKE VISIBILITY. *Preprint, American Society of Mechanical Engineers, New York, 7p., 1971. 8 refs. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D. C., Nov. 28 - Dec. 2, 1971, Paper 71-WA/GT-10.)*

The effect of engine geometry on aircraft smoke visibility was investigated with respect to general effects of jet entrainment on smoke visibility; transition distance to self preserving jet; decay of darkness; actual exit darkness; threshold of exhaust visibility; and coalescence of parallel jets. The initial visibility of the jet depended on the mass emission rate of smoke times the square of ambient gas density and gross jet thrust. After attainment of self-preserving velocity and concentration profiles, the darkness of the aero engine smoke plume decreased with distance. Quantitative criteria are derived for the engine spacing and magnitude of effect. (Author abstract modified)

16379 APTIC NO. 34565

Cohan, L. J. and J. H. Fernandes

INDUSTRIAL WASTE DISPOSAL PROBLEMS. *American Inst. of Plant Engineers, New England Region, Proc. New England Plant Eng. Maintenance Conf., Annu., 2nd, Newton, Mass., 1970, p. 1-7 (May 20-21.)*

The magnitude of the problems associated with waste disposal is discussed. Solution to the problems of waste were presented and all incorporate some form of the combustion process. Incineration was chosen as the method for disposal because it results in maximum volume reduction while producing a sterile residue. A small 200 to 1200 lb/hr incinerator works on the principle of pyrolytically reducing the refuse, with the gaseous effluent passing through an afterburner to control emissions. This unit is normally acceptable for on-site incineration in small plants. For larger capacities, the three-ton per hour incinerator is available. In this unit, unprepared refuse is fed onto an initia-impact grate where it is burned vigorously to a sterile ash with a minimum of odors. Combustion gases are routed to a wet scrubber for particulate matter removal before being released to the atmosphere. A flash drying and burning system for the disposal of refuse and sludge was also described. For liquid wastes, the Loddby furnace, a horizontal, refractory lined, cylindrical unit, is designed to burn high moisture content liquid wastes without or with a minimum of auxiliary fuel. A method of direct flame incineration was developed to control the odor problem. With this method, odorous vapor and particulate matter are exposed to a high temperature flame and are oxidized into harmless water vapor and carbon dioxide.

16380 APTIC NO. 34487

Crandall, Willard A.

PARTICULATE MATTER - ?. *Combustion, 43(4):15-17, Oct. 1971.*

Material defined as particulate matter is determined. Constituents of particulate matter may include fly ash, airborne solids, dust, and gases from point and area sources and reaction products. Particulate matter in the atmosphere and particulate emissions for source control are discussed. Non-combustible components versus particulate precursors are examined. Recommendations for the establishment of test procedures and emission standards are presented.

16381 APTIC NO. 34441

Davitaya, F. F.

AIR POLLUTION AND THE PROBLEMS OF FREE OXYGEN. *(Zagryazneniye zemnoy atmosfery i problema svobodnogo kisloroda). Text in Russian. Vestn. Akad. Nauk SSSR, 41(7):66-71. July 1971.*

Recommendations for the maintenance of oxygen and carbon dioxide equilibrium in the atmosphere are discussed. An increase of approximately 10% in atmospheric CO2 has occurred during the recent half-century. This was due to the activity of man. The decrease in free atmospheric 02 during this period was calculated to constitute 0.02%. If 02 consumption would occur at the same pace in the future, two thirds of the total free atmospheric and hydrospheric oxygen would be used up within the next 100,000 years. Such decrease in available oxygen could be critical for the survival of the biosphere. Likewise, the atmospheric CO2 content may reach dangerous concentrations if its increase would occur at a rate of 10%/50 yrs. Energy sources that would not require oxygen consumption are needed. The use of solar radiation for transformation into various kinds of energy and the search for technologies capable of CO2 absorption producing 02 as a waste gas are suggested. The conflicts developing between man and his environment should be solved by organizing industrial production according to closed circuits -- the way recycling of matter and energy occur in nature.

16382 APTIC NO. 34988

Eliassen, Rolf

POWER GENERATION AND THE ENVIRONMENT. *Proc. Natl. Acad. Sci. U. S., 68(8):1938-1943, Aug. 1971. 7 refs. (Presented at the Symposium on Energy for the Future, April 26, 1971.)*

Environmental constraints placed upon alternative methods of electric power generation are examined with respect to urban and regional planning, industrial management, effects of generating stations and fuel consumption on air, water, and land environments, and problems of strip mining. Emissions from fossil-fueled generating stations include sulfur oxides, particulate matter, carbon monoxide, nitrogen oxides, and waste heat. The economics of the use of alternative fuels within the constraints of the air environment are discussed for nuclear fission, fusion, gas, oil, and coal.

16383 APTIC NO. 34439

Elshout, A. J.

ECONOMIC EVALUATION OF THE PURE AIR IN RIJNMOND. *(Economische waardering van de schaarse lucht in Rijnmond). Text in Dutch. Electrotechniek, 49e(11):510, May 1971.*

A previous article in the Economic-Statistic Report no. 2791 of March 1971 by F. Muller and W. Pelupessy entitled Economic Evaluation of Pure Air is criticized. That article gave values of the nitrogen oxide emissions in tons/year for 10 sectors for the Rijnmond area in the year 1965; figures showed electric utilities contribute 38% of NOx emission, industries contribute 42%, housing 12%, and others 8%. However, these emission figures were calculated based on a chimney height of 100 meters. Thus, the percentages are highly distorted, since the percentages are highly distorted, since the NOx emissions, due to automobiles are almost neglected by this method. If a one meter height had been used, instead of the 100 meter height, completely different percentages of NOx emissions would result.

16384 APTIC NO. 34892

Falkenberry, Harold L.

STATE OF THE ART OF LIMESTONE-BASED PROCESSES FOR REMOVAL OF SULFUR OXIDES FROM POWER PLANT STACK GASES. *Limestone, 8(28):22,37-39,49-52, Summer 1971. (Presented at the National Limestone Institute, Annual Convention, 26th, 1971.)*

In 1968, the Air Pollution Control Office and the Tennessee Valley Authority contracted to conduct a full scale test of the limestone injection process on one of the boilers at TVA s Shawnee Steam Plant. In addition to being one of the simplest of processes, the dry limestone injection process appears to be the least expensive to install. It may not be as efficient as other processes, however, and relatively large quantities of solid reaction product must be stored. It adds to the total dust burden to be collected from the stack gases, and may have an unfavorable effect on the efficiency of the electrostatic precipitator. In the limestone wet scrubbing sulfur dioxide removal process, the combustion gases leaving the air preheater are passed through an aqueous scrubber where the sulfur oxides and limestone constituents react to form either calcium or magnesium sulfites and sulfates. The pulverized limestone may be injected into the furnace for calcining and partial reaction in the gas prior to passing through the wet scrubber. In addition to wet limestone scrubbing, fuel desulfurization, desulfurization during combustion, and stack gas desulfurization are also discussed for the control of sulfur oxides from electric power production.

16385 APTIC NO. 34763

Fonteyn, M.

IS THE PAINT INDUSTRY RESPONSIBLE FOR THE POLLUTION OF OUR ENVIRONMENT? (L industrie de la peinture est-elle responsable de la pollution de notre environnement). Text in French. Tribune CEBEDEAU (Centre Belge Etude Doc. Eaux), 24(327):67-69, Feb. 1971. (Presented at the Congres de la Federation des Jeunes Chefs d Enterprises d Europe, Brussels, Belgium, Nov. 6, 1970.)

Paint is a material which contains oil and/or synthetic resin, pigments for opacity and color, and in most cases, solvents and diluents to achieve sufficient fluidity for application. A study made by the Dutch Institute for Paint Research shows that 37,000 tons of pollutants from the paint industry were emitted into the air in 1968 in The Netherlands. The largest portions of this total are 15,500 tons of aliphatic hydrocarbons (solvents) and 11,500 tons of aromatic hydrocarbons. The remaining pollutants are methyl alcohol, esters, ketons, halogenated carbon compounds, and other hydrocarbons. About 210,000 tons of the above pollutants originated from all sources, so that the paint industry appears to have been responsible for 18% of the air pollution caused by these emissions. The overall air pollution in the same period of time, including major emissions of carbon monoxide and sulfur dioxide, was estimated at two million tons; the paint industry then accounts for less than 2% of the total. Efforts are underway to develop effective control techniques.

16386 APTIC NO. 34460

Fraas, A. P.

A POTASSIUM-STEAM BINARY VAPOR CYCLE FOR BETTER FUEL ECONOMY AND REDUCED THERMAL POLLUTION. *Preprint, American Society of Mechanical Engineers, New York, 13p., 1971. 24 refs. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D. C., Nov. 28-Dec. 2, 1971, Paper 71-WA/Ener-9.)*

Both fuel supply and thermal pollution considerations, which are becoming progressively more important, strongly favor the development of a higher temperature, and more efficient, thermodynamic cycle for electric power plants. About 200,000 hr of operation of boiling potassium systems, including over 15,000 hr of potassium vapor turbine operation under the space power program, suggest that a potassium vapor topping cycle with a turbine temperature inlet temperature of approximately 1500 F merits consideration. A design study was carried out to indicate the size, cost, and development problems of the new types of equipment required. The results indicate that a potassium vapor cycle superimposed on a conventional 1050 F steam cycle would give an overall thermal efficiency of about 54% as compared to only 40% from a conventional steam cycle. Thus the proposed system would have a fuel consumption only 75% and a heat rejection rate only 50% that of a conventional plant. Further, it appears possible that the capital charges for the proposed plant might be lower than those for a conventional plant. A high grade fuel oil or gas will be required, but this is likely to be necessary anyway to meet increasingly stringent limitations on sulfur dioxide, nitrogen oxides, and ash emissions. (Author abstract)

16387 APTIC NO. 34635

Friedlander, S. K.

THE CHARACTERIZATION OF AEROSOLS DISTRIBUTED WITH RESPECT TO SIZE AND CHEMICAL COMPOSITION. *Aerosol Sci., vol. 1:295-307, 1970. 24 refs.*

The particles of an aerosol are often distributed with respect to both size and chemical composition. Such aerosols can be characterized mathematically by defining a size-composition probability density function, provided the relative positions within the particle of the chemical components of which the aerosol is composed are not important. An equation can be derived for the change of the probability density function with time as a result of the collision of particles of different chemical composition composing the aerosol. The equation is easily generalized to include such effects as convection, diffusion, and sedimentation. It provides a link between the aerosol, gas phase chemical reactions, and condensation processes. Data on the atmospheric aerosol is now collected on a routine basis by sampling stations around thy United States. Certain integral functions of the probability density function can conveniently be defined as the information associated with the size distribution of the aerosol. The total amount of information associated with a model size spectrum for the atmospheric aerosol was calculated, assuming that the measurements were made using a device with eight classification ranges, roughly equal as to logarithmic span. The result was 2.19 bits, compared with a maximum obtainable of 3.0 bits. Problems for the future include finding solutions to the dynamic equation for the size-composition density function and extending the information theory to include rate effects, errors, and the costs of gathering information. (Author summary modified)

16388 APTIC NO. 34542

Fritz, R.

TENNESSEE VALLEY AUTHORITY LARGEST COAL CONSUMER OF THE AMERICAN POWER PLANTS. *(Tenesse Valley Authority groesster Kohleverbraucher der amerikanischen Elektrizitaetswirtschaft). Text in German. Glueckauf (Essen), 107(23):904-905, 1971.*

In 1970 the coal consumption of the Tennessee Valley Authority amounted to 32.2 million tons, by the mid-1970s it will have reached the 40 million ton mark. Environmental protection is one of the main concerns. Prior to construction of a new plant, the concentrations of dust and sulfur dioxide emissions caused by the new plant are calculated from the size of the plant, the meteorological conditions, the height of the stack, the coal consumption, and the quality of the coal. The construction license will be granted only if the values do not exceed set standards. Since 1966 the TVA succeeded in reducing the fly ash emissions by 50%. Electrostatic ash precipitators were installed in the past year in three power plants; two more such facilities have been ordered. It is hoped that with these precipitators, which cost about 100 million dollars, about 98% of the fly ash can be retained. The elimination of sulfur dioxide is more difficult; no satisfactory desulfurization method has yet been found. The 550 MW power plant in Widows Creek shall receive a wet-lime-desulfurization plant. It is hoped that this cleaning system will remove 80% of the SO2, 99% of the fly ash, and some fraction of the nitric oxide.

16389 APTIC NO. 34697

Gartrell, F. E., G. F. Stone, and T. A. Wojtalik

ENVIRONMENTAL QUALITY PROTECTION: LARGE STEAM-ELECTRIC POWER STATIONS. *International Atomic Energy Agency, Vienna (Austria), and Atomic Energy Commission, Washington, D. C., Symp. Environ.*

Aspects Nucl. Power Stations, New York, 1970, p. 453-474. 11 refs. (Aug. 10-14, Paper 146/28.)

Environmental activities of the Tennessee Valley Authority are directed not only at conserving the region s water, air, and land, but also at improving their quality for future use. To appraise the effects of a large multi-unit nuclear plant on the whole environment, TVA is planning comprehensive and integrated environmental monitoring programs. Already underway at the Browns Ferry Nuclear Plant, being built in north Alabama, are studies to document levels of natural and man-made radioactivity in air, soil, vegetation, water, and aquatic life to establish baseline data some two years before plant start-up. Similar studies are being conducted in Wheeler Reservoir to document pre-startup stream temperatures and to obtain data on fish populations and other related aquatic organisms. To obtain much needed quantitative and qualitative information on the potential effects of heated water discharges on aquatic life, TVA and the Federal Water Quality Administration are planning a special research station adjacent to the Browns Ferry plant. (Author abstract modified)

16390 APTIC NO. 34790

Glaser, Peter E.

THE ENVIRONMENTAL CRISIS IN POWER GENERATION AND POSSIBLE FUTURE DIRECTIONS. *Preprint, Operations Research Society of America, Baltimore, Md., 17p., 1971. 30 refs. (Presented at the Operations Research Society of America, National Meeting, 39th, Dallas, Tex., May 7, 1971.)*

Between now and the year 2000, if we are to meet our burgeoning power requirements, we will have to increase our power-generating capacity to six times its present level -- from 330 million kilowatts to nearly two billion. In that time, electric utilities will have to invest about $600 billion in capital expenditures. Present efforts to avoid a power crisis are moving along three paths: increase the efficiency of fossil fuel power plants, develop advanced nuclear power plants, and control the fusion reaction. Recent advances in technology have markedly increased the potential for large-scale conversion of solar energy to heat or to electric power.

16391 APTIC NO. 34696

Gould, W. R. and J. B. Moore

REGIONAL ENVIRONMENTAL CONSIDERATIONS IN THE EVOLUTION OF AND OPERATING EXPERIENCE WITH THE SOUTHERN CALIFORNIA EDISON COMPANY GENERATING SYSTEM. *International Atomic Energy Agency, Vienna (Austria), and Atomic Energy Commission, Washington, D. C., Symp. Environ. Aspects Nucl. Power Stations, New York, 1970, p. 413-425. 9 refs. (Aug. 10-14, Paper 146/44.)*

As a result of the ever continuing growth of population and industry in the Los Angeles area, an area of restricted air replenishment with the majority of potable water imported, environmental factors have strongly affected both design of generating equipment and its siting. For the initial modern coastal steam stations, condenser cooling water structures were designed to minimize the intake of fish and to increase the rate of heat transfer to the atmosphere; in some cases, water circulation in bays was improved. Combustion temperatures were controlled to reduce formation of the oxides of nitrogen, a primary constituent of photochemical smog. Efforts were made to increase the supply of natural gas. Development of boiler flue gas filtration using powdered additives and glass fiber filters was begun in the early 1960 s. A nuclear power unit was ordered, and new generating stations were sited hundreds of miles from the load center, near coal deposits or available water. Environmental monitoring is conducted, while low-sulfur fuels are required. A study of the engineering and licensing feasibility of underg round construction of nuclear units at metropolitan sites has begun. (Author abstract modified)

16392 APTIC NO. 34680

Grobman, Jack, Robert E. Jones, Cecil J. Marek, and Richard W. Niedzwiecki

COMBUSTION. *National Aeronautics and Space Administration, Cleveland, Ohio, Lewis Research Center, Aircraft Propulsion Conf. Proc., Cleveland, Ohio, 1970, p. 97-134. 17 refs. (Nov. 18-19.)*

NTIS: NASA SP-259

Some of the present requirements for gas turbine combustors are presented, as well as the latest engine operating conditions which effect the problems in combustor design. The research approaches being used to solve these problems are discussed. The various criteria that are used in the design of gas turbine combustors include combustion efficiency, total-pressure loss, durability, exit temperature profile, and altitude relight. Combustor size and weight are important because they influence the overall weight of the engine. Combustor length affects the turbine shaft length and the bearing requirements. Reducing combustor length also reduces the amount of air required to cool the combustion liner by reducing the linear surface area. Since linear temperatures are increasing, the durability and life of the liner are effected, with the trend towards higher pressures along with higher inlet and exit temperatures. Short combustors and high-exit-temperature combustors are discussed. Exhaust emissions are considered.

16393 APTIC NO. 34386

Gupta, S. D. and N. V. Iyer

EVAPORATIVE EMISSIONS FROM GASOLINE-POWERED VEHICLES POLLUTE THE ENVIRONMENT AND WEIGH HEAVILY ON THE COUNTRY S ECONOMY. *Petrol. Hydrocarbons, 6(2):121-124, July 1971. 9 refs.*

An average car in India loses about 20 kg of gasoline per year due to evaporation from the tank and carburetor. In 1975, the gasoline powered vehicles in India will be pumping 25,000 tons of gasoline into the atmosphere resulting in pollution of the environment and a loss of money to the consumer. Loss of lighter fractions due to evaporation will leave the residual gasoline lower than minimum octane number, resulting in a loss of engine performance and increased wear and tear. Legislative control has been imposed on evaporative emissions in the United States. (Author conclusions modified)

16394 APTIC NO. 34654

Haedike, Edward W.

BUILDING A BETTER INCINERATOR. *Ind. Gas, 51(11):15-17, Nov. 1971.*

Engineers know well the necessity for adequate temperatures in incinerators for clean, smokeless combustion. The need for supplemental heat, and sometimes for furnace preheating, is recognized as a practical solution to the problem of low combustion temperatures. The burnout of smoke is achieved at 1500 F and the oxidation of most odorous compounds is completed at this temperature. The Incinerator Institute of America classification of waste is cited. Commercial fuel gas or fuel oil can be considered for firing incinerators. Modern incinerators are designed to locate the package burner in the side wall and firing into the combustion chamber above the grate level and above the refuse heap. The flame preferably should be of the long and luminous type, so that it may sweep across to all sides of the waste and quickly transfer its radiant heat to the combustion chamber. Sidewall location of the burner, the above grate installation, and a double-chamber incinerator are mentioned. Manual operating control, automatic operating control, thermoelectric control, electronic control, and non-electronic spark are available for use with the burners.

16395 APTIC NO. 34647

Hamilton, Wayne L. and James E. Miller

HIGH LEAD CONCENTRATIONS IN COLUMBUS SNOW. *Ohio J. Sci., 71(5):313-316, Sept. 1971. 4 refs.*

Lead concentrations in snow collected on the ground within 100 feet of streets and roads in January, 1970, were determined by atomic absorption spectrophotometric analysis of dissolved and particulate fractions of impurities. Twenty-seven samples of snow were collected over a 20 sq mile, suburban, mainly residential part of Columbus, Ohio. Measured concentrations were between 0.05 and 1.09 ppm Pb, with an average of 0.41 ppm. In all but one sample, the lead concentration exceeded the U.S. Public Health Service safe limit for drinking water of 0.05 ppm. The temporal and areal distributions of concentrations, together with a comparison with iron concentrations measured in the same samples, indicated that automobile exhaust was the probable source of the lead. (Author abstract)

16396 APTIC NO. 34889

Hilado, Carlos J.

THE EFFECT OF CHEMICAL AND PHYSICAL FACTORS ON SMOKE EVALUATION FROM POLYMERS. *J. Fire Flammability, vol. 1:217-238, July 1970. 13 refs. (Presented at the Polymer Conference Series, Detroit Univ., Mich., June 1970.)*

Increasing concern with consumer safety has brought greater attention to smoke evolution, which affects the ability to escape from a burning structure. The Rohm and Haas and National Bureau of Standards smoke chambers are widely used to evaluate this characteristic. Extensive data are presented from tests with both chambers on some chemical and physical factors affecting smoke evolution from a wide variety of polymers. The amount of smoke produced from burning polymers is highly sensitive to conditions of exposure and to the density and thickness of the polymer. Interactions between chemical and physical factors make analysis of results difficult, and the choice of criteria will be critical in many comparisons between materials. The use of lower density cellular materials, keeping mass per unit area of surface constant, may reduce maximum smoke production but cause more rapid smoke generation early in the exposure. The action of some flame retardant additives in inhibiting flame spread by limiting polymer breakdown can result in increased smoke when the larger fragments produced are entrained in the combustion gases. (Author abstract modified)

16397 APTIC NO. 34693

Hubbert, M. K.

ENERGY RESOURCES FOR POWER PRODUCTION. *International Atomic Energy Agency, Vienna (Austria) and Atomic Energy Commission, Washington, D. C., Symp. Environ. Aspects Nucl. Power Stations, New York, 1970, p. 13-43. 21 refs. (Aug. 10-14, Paper 146/1.)*

The world s energy resources suitable for power production are of two classes: various channels of the continuous energy flux from extra-terrestrial sources and from the earth s interior; and chemical, thermal, and nuclear energy stored in the outer part of the lithosphere and in the oceans. The continuous energy fluxes are from solar radiation, geothermal energy, and tidal energy. Of the solar energy influx, the only fraction suitable at present for large-scale power production is the approximately 40,000 times 10 to the 12th power W expended in evaporation of water and in atmospheric and oceanic circulation. The fraction of solar influx stored chemically by photosynthesis is indicated, as well as the minute fraction stored during the geologic past-- the source of the energy of coal and petroleum. Tidal power is capable of large-scale development in a small number of coastal localities. World reserves and consumption of coal, lignite, and crude oil are indicated. Viewed on a time scale of a few thousand years of human history before and after the present, exhaustion of the world s fossil fuels will be but an ephemeral event of a few centuries. Without the use of breeder reactors, fission power based on uranium-235 will probably also be short-lived; with complete breeding, however, the energy obtainable from uranium and thorium would be orders of magnitude larger than that from fossil fuels, and hence, sufficient for the world s power requirements for additional centuries or millenia. (Author abstract modified)

16398 APTIC NO. 34364

Iverbach, David

MOTOR VEHICLE EXHAUST POLLUTION. *Aust. Chem. Eng., 12(5):11-21, June 1971. 42 refs.*

Automobile pollution is discussed with reference to the mechanism of the formation of major pollutants (nitric oxide, hydrocarbons, carbon monoxide); the effect of engine and operating variables on their concentration; government legislation and the control techniques employed to meet them; and the potential of some alternative power plants. The importance of air-fuel distribution, compression rate, spark timing, and engine speed in determining pollutant concentrations is stressed. European and U. S. test cycles are compared graphically and emission standards are summarized for both the U. S. and Europe. Engine modifications can reduce pollutant levels significantly, particularly modifications to the carburetor-ignition system and combustion chamber. Such modifications are preferable to exhaust manifold reactors and air injection systems. With appropriate engine modifications, disposable or refillable catalytic devices can perform well and further reduce emissions. Of all alternatives to the internal combustion engine, the gas turbine has the greatest potential; but problems exist with acceleration lag, nitric oxide levels, fuel economy, noise, and capital cost.

16399 APTIC NO. 34622

Kahlen, Hans, Wolfgang Runge, and Wolf-Dieter Weigel

STUDY OF DRIVES OF ELECTRIC CITY CARS. *(Untersuchungen an Antriebssystemen von Elektro-Stadtautos). Text in German. Elektrotech. Z. A., 92(10)571-575, Oct. 1971. 13 refs.*

A car driven by an electronically controlled series-connected direct current motor with regenerative breaking was taken into operation in city traffic on October 15, 1969. The car operates satisfactorily during all traffic and weather conditions. The acceleration from 0 to 50 km/h takes 8.5 sec. At speeds above 50 km/h the traction is low. The high breaking power of the electric break permits a slow-down of two m/sq sec. If a faster slowdown is required the hydraulic breaks must be applied. The breaking path for the electric break at a speed of 50 km/h is 55 m. A distance of 40 to 45 km of city traffic conditions can be spanned. Through the more frequent acceleration and breaking maneuvers, the relative energy regeneration is larger in city traffic than in the outscirts.

16400 APTIC NO. 34769

Kaiser, Elmer R.

INCINERATION OF METAL SALVAGE. *In: Principles and Practices of Incineration. Richard C. Corey (ed.), New York, Wiley-Interscience, 1969, Chapt. 8, p. 227-238. 2 refs.*

Furnaces of special design are useful in fire cleaning metals of combustibles and in melting lead, zinc, and aluminum from iron and steel scrap. Controlled burning produces a better product and meets local air pollution control standards. The basic requirements for incineration in metal recovery are temperatures high enough to maintain gasification and burning of combustibles; temperatures low enough to prevent more than superficial oxidation or loss of the metal being salvaged; air supply ample for complete combustion; low consumption of auxiliary fuel; smokeless chimney effluent and stack gases low in dust, fly ash, noxious gases, and odors; and throughput sufficient to justify the investment in furnace equipment, fuel labor, and maintenance. The smokeless burning of automobile bodies is discussed and a description of a furnace and afterburner suitable for this purpose is given. The burning of wire insulation is described and air pollution control methods, such as afterburning and scrubbing, are discussed. Steel drums can be fire cleaned in closed batch or conveyor furnaces; when this is done with temperature and combustion control there is no smoke. The debonding of brake shoes and the melting of lead sheathing from insulated wire cable can be accomplished with a minimum of air pollution if the proper furnace is used. Incineration can also be applied to the recovery of silver from photographic paper and film and the recovery of lead from batteries.

16401 APTIC NO. 34378

Kawasaki, G., S. Nishino, H. Okumura, and I. Senda

ON EXHAUST GAS OF HOT FORGING PROCESS. *(Nekkan toransufa puresu kako kojo no haishutsu gasu ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):100, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, Tokyo, Japan, 1970.)*

White smoke collected in front of ventilators of hot forging processes was analyzed. The hot forging oil is a highly viscous, refined mineral oil mixed with 20% black lead and amine surface active agents (0.5%). The mist was collected and washed by carbon tetrachloride and was adsorbed by activated carbon. The adsorbed material was measured by infrared spectrography. Distinct adsorption belts appeared at 2962 reciprocal cm, 1450 reciprocal cm, and 1375 reciprocal cm. Gas chromatography measurements of CC14 soluble material and condensed oil revealed slightly more hydrocarbon of low boiling point in the former. The result of analyses revealed 800-900 gm of high molecule hydrocarbons per one cu m exhaust gas taken at the ventilation entrance of the hot forging transfer press process. In another experiment, forging oil was distilled at 300 C, and 6.2 g of oil steam was mixed with 100 l air; it was sent to the tower filled with Raschig rings or coke, and the oil steam was washed down by water; 93.6% of the oil steam was captured by the water.

16402 APTIC NO. 34888

Kellogg, W. W.

POLLUTION OF THE UPPER ATMOSPHERE BY ROCKETS. *Space Sci. Rev., vol. 3:275-316, 1964. 107 refs.*

The amounts of various constituents that would have to be continually injected into the upper atmosphere by rockets to double the worldwide natural concentrations there are estimated. The calculations involve consideration of the natural atmospheric abundances of constituents such as water, carbon dioxide, nitric oxide, oxide, sodium, potassium, lithium, and hydrogen; the residence times in various regions of the atmosphere, since these determine how rapidly a constituent will be removed; and the chemical or photochemical stability of a substance exposed to the upper atmosphere environment. Results indicate that doubling the CO_2, H_2O, or NO content would require 1000 to 100,000 Saturn-type rockets per year, each injecting 100 tons of exhaust above 100 km. However, a few hundred small rockets per year, each containing 10 kg of the chemical, would probably double the Na content. Less than two such rockets per year would be expected to double the Li content. These last conclusions have implications for future tracer experiments using these substances. (Author abstract modified)

16403 APTIC NO. 34539

Klaut, Vl.

NITROGEN OXIDES IN THE OPEN ATMOSPHERE. *(Kyslicniky dusiku ve volne atmosfere). Text in Czech. Cesk. Hyg. (Prague), 16(4/5):166-171, 1971. 83 refs.*

Sources, atmospheric concentrations, and physical and chemical properties of nitrogen oxides are reviewed. Attention is directed to the influence of nitrogen oxides on the color of the atmosphere, vegetation, their participation in photochemical reactions, their dispersion, and the effects of peroxyacyl nitrates. The pollution of urban atmospheres by nitrogen oxides correlates with traffic density. (Author summary modified)

16404 APTIC NO. 34879

Klevtsov, T. A.

MAN-MADE RELIEF SHAPES IN THE KRIVOY ROG IRON ORE AREA; THEIR EXPLOITATION AND REGENERATION. *(Antropogennyye formy relyefa Krivorozhskogo zhelezorudnogo basseyna ikh vosstanovleniye i ispolzovaniye). Text in Russian. Polska Akademia Nauk, Zaklad Badan Naukowych Gornoslaskiego okregu Przemyslowego, Mater. Miedzynarodowej Konf., Wplyw zanieczyszczen Powietrza na lasy, 6th, Katowice, Poland, 1968, p. 451-452. (Sept. 9-14.)*

The Krivoy Rog area constitutes one of the main raw material sources for the black metallurgy of the USSR. The extraction of iron ores and of magnetitic quartzites by the uncovered method generates large artificial embankment areas. These relief forms may reach more than 20 m in height and they consist of debris from friable rocks. Thus difficulties in the building of roads or new town units as well as water and air pollution are enhanced. Forest planting, irrigation and agricultural exploitation of such areas are among the recommendations made for their recuperation. It is suggested that the mining industries should take care of the regeneration possibilities of these damaged territories.

16405 APTIC NO. 34461

Kress, Ralph and S. W. Lovejoy

PROPOSED GAS TURBINE PROCUREMENT STANDARD: ENVIRONMENTAL CONSIDERATIONS. *Preprint, American Society of Mechanical Engineers, New York, 5p., 1971. 12 refs. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D. C., Nov. 28-Dec. 2, 1971, Paper 71-WA/PTC-3.)*

Installation of a gas turbine power plant requires consideration of the effects of the equipment and its uses on the local environment. These effects can be categorized by the contributing pollutants from the power plant. Unburned hydrocarbons, carbon monoxide, oxides of nitrogen, and oxides of sulfur are cited, as well as particulate emissions and thermal effects. The allowable levels of these pollutants may be dependent upon legislation set up at the local level where the gas turbine is to be installed. Information is presented for determining the pollutant levels the user of the turbine considers desirable for the installation, as well as the information that he might request from the manufacturer. Monitoring methods are indicated. Measurements of smoke visibility are given with a smoke number.

16406 APTIC NO. 34853

Kudrna, J.

POLLUTION OF ATMOSPHERE BY BRICKWORKS. *(Znecistovani ovzdusi cihlarskymi zavody). Text in Czech. Stavivo, 47(3):81-84, 1969. 3 refs.*

The source of pollution in brickworks are round kilns, boiler houses, and drying ovens with an independent source of heat. The principal pollutants are fly ash, SO_2, CO, and soot. Current regulations are strictest for SO_2 emission. Maximum permissible levels depend on stack height; for an average stack height of 39.6 m, these levels are, for fly ash, 53.7 kg/h; for SO_2, 45 kg/h; and for other pollutants, 90 kg/h. Most brickworks burn bituminous coal with a sulfur content of 1 to 4%. Four examples are cited of Czechoslovakian brickworks which exceeded maximum emission levels. This happens where the kiln has no stack of its own but has a boiler house. The situation can usually be remedied by increasing the height of the stack by 2 to 4 m. The general situation can be further improved by switching from coal to heating oil or to natural gas. When fuel oil is burned all its sulfur is emitted into the atmosphere; when coal is burned, part of the sulfur oxides is absorbed by the ash. However, since the quantity of fuel consumed by brickworks in a given period of time is comparatively small, this problem is not serious.

16407 APTIC NO. 34564

Land, George W.

FOSSIL FUEL: NATIONAL ENERGY SUPPLY AND AIR POLLUTION. *Preprint, American Society of Mechanical Engineers, New York, 15p., 1971. 20 refs. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D. C., Nov. 28 - Dec. 2, 1971, Paper 71-WA/Fu-4.)*

The influence of projected patterns of energy use on the emissions of pollutants and the resultant levels of air pollution in the United States are discussed. Energy consumption data for coal, petroleum, natural gas, hydro power, and nuclear power were collected and correlated with emissions of particulates, sulfur oxides, nitrogen oxides, and carbon compounds. Technology development in emission controls, reliability, and costs are examined. The effect of controlled emissions on air quality and ambient air quality levels are discussed.

16408 APTIC NO. 34907

Lear, William P. and Kenneth L. Nall

VEHICLE AIR POLLUTION - THE PROBLEM AND ITS SOLLUTION. *Preprint, Society of Automotive Engineers, Inc., New York, 28p., 1971. 82 refs. (Presented at the Society of Automotive Engineers, Chicago Section, May 12, 1970, Paper 710272.)*

Automotive emissions account for at least 60% of the total air pollution in the United States up to 92% of the pollution in some of our sprawling urban areas. Smog episodes are cited, as well as health hazards from carbon monoxide, hydrocarbons, nitrogen dioxide, lead, ozone, and oxides of sulfur. The California emissions standards are tabulated for 1966-1974. Design criteria and operating variables of a steam-powered vehicle and a gas-turbine electric system are described. Reduction of the number of vehicles in use is another method of vehicle emissions control. In designing public transportation system to achieve increased social acceptability, the external and internal appearance of the vehicle, passenger comfort and safety inside the vehicle, and safety from external environments are important considerations. The low-emission vapordyne automotive power system, which burns kerosene or any other combustible liquid, and a new bus design, are described in detail. Estimated pollution control costs and a method computing future air pollution from motor vehicles are included.

16409 APTIC NO. 34612

Lenz, W.

POWER ECONOMY AND ENVIRONMENT. SURVEY OF THE STATE OF THE ART-REPORT OF A MEETING IN COLOGNE. *(Energiewirtschaft und Umwelt. Ueberblick ueber den stand der Technik-Bericht von einer tagung in koeln). Text in German. VDI (Ver. Deut. Ingr.) Nachr. (Berlin), 25(42):12-13, Oct. 1971.*

A survey of the emissions by power plants over the years 1970 to 1975 to 1980 reveals that the dust emission of larger particles will go down because old power plants will be shut down. The fraction of fine dusts will further increase and will be widely distributed in industrial centers. They are the respirable fraction which will penetrate into the lungs and reduce the resistance against carcinogens. The gaseous emissions will contribute their share in tha attack on the lungs. The sulfur dioxide emissions, however, will hardly increase over the next ten years since the new power plants will be mostly nuclear plants. The iron and steel industry solved the problem of dust emissions. The coking plants too reduced their emissions by 80%. Despite these achievements, the dust emissions in the Ruhr Valley exceeded the limit concentrations in 1964 by 12% of the Valley area and in 1969, by 3%.

16410 APTIC NO. 34812

Liff, Noah

SOLVING AIR POLLUTION AND SOLID WASTE PROBLEMS WITH AN AUTOMOBILE SHREDDER. *Vanderbilt Univ., Nashville, Tenn., School of Engineering; and Tennessee Stream Pollution Control Board; and Tennessee Dept. of Public Health, Nashville, Environ. Water Resources Eng. Conf., 9th, Annu., Nashville, Tenn., 1970, p. 59-62. (June 4-5.)*

Historically, old automobiles have found their way into the steelmaking process by passing through the hands of a scrap processor who burned them in the open to remove all combustibles and contaminants prior to their being baled into a cube form. The basic oxygen furnace which was introduced into the steel industry in the mid 1950 s does not use as much purchased scrap as did the conventional open-hearth furnace. The continuation of open burning and permitting these combustible items to be oxidized with the resulting pollutants being put into the atmosphere has become totally unacceptable in today s society. An automobile shredder was designed to take an old automobile with its contaminants; shred it; and mechanically separate, by means of magnetic separators and air suction, the desirable iron needed by steel mills from the contaminants, which basically were solid waste and needed to be removed to a land fill. Advantages of the shredding process are discussed.

16411 APTIC NO. 34442

Malschaert, F. P.

AUTOMOBILE AIR POLLUTION AND WAYS TO FIGHT IT. *(Luchtverontreiniging door benzinemotoren en middelen tot bestrijding). Text in Dutch. Ingenieursblad, 40(15-16):417-428, 1971. 6 refs.*

The harmful components of the automobile exhaust gases are carbon monoxide, unburned hydrocarbons, nitrogen oxides, sulfur dioxide, and lead. The concentration of these pollutants depends on the thermodynamics of the engine. A gasoline engine exhaust contains high CO, high HC, and low NOx concentrations. The diesel engine exhaust contains low CO, low HC, but high NOx concentration. Comparisons of a typical European and American automobiles are given. The emissions of NOx, CO, and hydrocarbons during stationary running, acceleration, deceleration, and constant speed running of a passenger car is sketched. European Economic Community tests are discussed. Passenger cars are tested inspection stations in Sweden. Automobile standards issued by the State of California and the Federal government are mentioned. Different methods of reducing air pollution are given, such as improved carburetion, a transmission controlled spark advance system, and an exhaust gas collector reactor. Methods of NOx and Pb reduction are summarized. A list of topics of interest for research in automobile air pollution is included.

16412 APTIC NO. 34484

Mark, W. van der

AIR POLLUTION DUE TO FLUORIDES. *(Luchtverontreiniging door fluor). Text in Dutch. Chem. Tech. (Amsterdam), 26(15):413-417, 1971. 30 refs.*

The destructive effects of fluorides on plants, animals, and humans are described. Sources of fluorides such as aluminum industries and phosphate factories are discussed. The measurement and sampling of fluoride contents are explained. Two methods of measurement are described: measurement of total fluoride content in air and collection of gaseous fluorides or fluoride containing materials. The advantages and disadvantages of each method are discussed. Electrochemical, spectrophotometric, and activation analyses are mentioned. The separation of fluorides by a microdiffusion method is briefly described.

16413 APTIC NO. 34571

Merz, Otto

LACQUERS AND COATINGS FOR SURFACE TREATMENT AND POSSIBLE IMMISSIONS. *(Lacke und Beschichtungsstoffe zur Oberflaechenbehandlung und moegliche Immissionen). Text in German. Staub, Reinhaltung Luft, 31(10):395-396, Oct. 1971. 5 refs.*

Emissions develop during the drying process of lacquered or coated surfaces. The process takes place at different temperatures. A heating-up zone and a drying or reaction zone must be distinguished. In the first zone with temperatures between 80 and 150 C, high and medium volatile solvents, monomeres, and oligomeres evaporate. In the second zone between 160 and 200 C, the solvents, monomeres, and oligomeres which are difficult to volatilize evaporate. Aliphatic hydrocarbons, hydrogen chloride, alcohols, aldehydes, phenols, ketones, and acid amines are split off from solvents and binding agents. Zinc oxide and soot may be emitted during the combustion of fuel oil.

16414 APTIC NO. 34585

Meuthen, Bernd

WASTE AIR PROBLEMS IN THE COIL COATING INDUSTRY. *(Abluftfragen aus der Sicht der coil coating-industrie). Text in German. Staub, Reinhaltung Luft, 31(10):407-410, Oct. 1971. 23 refs.*

During the coil coating process, organic gaseous emissions develop. The gaseous emissions are primarily composed of volatilized organic solvents of a known nature, as well as components developing during the reaction of the binding agents and solvents on the hot furnace walls. Such reaction products are marked by annoying odors. According to the present experience, they amount to approximately four percent of the solid content. Type and quantity of the organic emissions are subject to great temporal fluctuations. The fraction of hydrocarbons emitted by such plants amounts to 0.1% of the total hydrocarbon emissions. Regulations in North Rhine Westphalia require cleaning of such waste gases to a residual carbon content of 300 mg/cu m. In other West European countries, no such stringent regulations exist. In the U. S., the use of certain solvents is prohibited and the emission quantities are limited. Catalytic combustion has been used as a control method. But this method is not very suitable because of catalyst poisoning. Thermal afterburning has found little application in Europe, but is the accepted method in the United States. The best solution would be the use of coating material which is free of solvents. Such coating material is available in form of so called power lacquers whose quality has yet to be improved for satisfactory use. A special method of lacquer drying, electron beam curing, is in the developmental stage. With the method, none of the present solvents will cause any emissions.

16415 APTIC NO. 34451

Morstedt, Sten-Erik

AUTOS - CHIEF SOURCE OF AIR POLLUTION. *(Bilen smutsar mest). Text in Swedish. Tek. Tidskr., 101(11):22-28, 1971.*

The exhaust gases of the automobiles represent the main source of air pollution. The quantity of the pollutants emitted by gasoline powered automobiles amounts to one half the fuel weight in city traffic. In April 1971, the Exhaust Gas Commission at the Ministry of Transportation submitted its final report on its five-year study. The report contains the technical foundations for the steps to be taken to curb auto emissions. Air pollution represents a major problem in densely populated areas with high traffic density. The auto emissions (carbon monoxide, nitrogen oxides, soot, particles, and sulfur dioxide) have been measured in particular streets and squares of Stockholm and other big cities in Sweden for a couple of years. The results are similar to those in other metropolitan areas. Three test methods have been developed for measuring auto emissions: ECE, USA 70 and USA 72. There are unambiguous correlations between the test results and test methods. The mean values obtained with the individual methods can be converted, and the limit values are comparable. The test methods and the limit values should be standardized on an international basis. Various engine designs and idling adjustments are discussed with special regard to air pollution. The present test methods are insufficient. The present countermeasures will not be effective in the future due to the steady growth in the number of vehicles. Even if the requirements become stricter as now suggested, the quantity of carbon monoxide and hydrocarbons emitted by automobiles will be approximately on the same level in the 80 s as it was in the 60 s. However, both maximum and average quantities of the pollutants in exhaust gases will decrease by 1985. Air pollution caused by vehicles should be considered in city planning.

16416 APTIC NO. 34726

Mortillaro, Luigi

A WORLD-WIDE PROBLEM IN THE SEVENTIES. THE DISPOSAL OF PLASTIC WASTE. *(Un problema mondiale degli anni 70. Lo smaltimento dei rifiuti di materia plastica). Text in Italian. Mater. Plast. Elastomeri, 7(3):730-735, 1971.*

The proceedings of the International Congress on the Treatment of Disposable Packaging Material to Avoid Environmental Deterioration held at Gardone Riviera, Italy on May 22-24, 1971, as they related to the disposal of plastic waste, are reviewed. While in Scandinavia the main problem is how to collect plastic waste in a country with low population density in a vast territory, in France the problem centers on the emission of toxic gases from incinerators. In France, an imposition of a tax on all plastic packaging materials has been proposed to finance proper disposal. Incineration presents only a temporary solution the goal is recycling and degradation. The increase in plastic waste with the collection of waste in polyethylene bags has increased the caloric content of waste from 1500 kcal to 2200 kcal per kg waste in 1970. While in Milan solid waste contains 5.2% plastic materials, London solid waste contains only 1.1%. The problem of plastic waste and of recycling can be solved by appropriate legislation, taxation, tax incentives, public education, research, and development. The emission of hydrochloric acid from incinerators can be solved by adding lime to the waste. The disposal of plastic waste by biodegration or by photodegradation through the addition of appropriate components to plastics, which do not affect their properties other than biodegradability, is in an experimental stage.

16417 APTIC NO. 34835

Mueller, Robert F.

THERMODYNAMICS OF ENVIRONMENTAL DEGRADATION. *National Aeronautics and Space Administration, Greenbelt, Md., Planetology Branch, Rept. NASA TM-X-65492, X-644-71-121, 14p., March 1971. 13 refs. (Presented at the American Geophysical Union, Annual Meeting, Washington, D. C., 1971.)*

NTIS: N71-23346

The laws of thermodynamics, which are concerned with energy transformations, place severe constraints on the affairs of man and his relationship to his environment. Indeed, thermodynamic principles seem particularly well-suited to treating the interaction of technology and natural systems and the major product of this interaction, pollution. There is one characteristic which all pollutants appear to have in common and which serves to define them in thermodynamic terms: their high energy content relative to the raw materials from which they were derived and relative to the degradation products which they ultimately yield. A wide variety of chemical pollutants are characterized by the possession of free energies of formation in excess of those of the raw materials from which they were derived. This energy was of course purposefully conferred through the manufacturing process and is again released as the material goes to a lower free energy state in spontaneous degradation. A quantitative illustration of the effect is afforded by the sulfur dioxide production of fossil fuel power plants. The thermodynamics of pollution, energy concentration in modified regions, recycling, pollution control and life style, and economics and thermodynamics are discussed.

16418 APTIC NO. 34678

Murphy, James L., Leo J. Fritschen, and Owen P. Cramer

RESEARCH LOOKS AT AIR QUALITY AND FOREST BURNING. *J. Forestry, 68(9):530-535, Sept. 1970. 25 refs.*

Foresters are concerned about the air polluting effects of forestry burning and a serious research effort is underway both to determine the extent of the problem and to find solutions. While studies thus far have been largely exploratory, preliminary indications are that the particulate in slash smoke may be of greater importance than the gaseous components. Fuel treatment and manipulation, sophisticated ignition techniques, and fuel booster systems will provide the slash burning manager with tools for modifying the burning operation and minimizing deleterious effects on air quality. Meteorological management of slash burning will do much to reduce the threat of air quality impairment from burning in the forest. Considerable emphasis is being devoted to disposing of logging slash by methods other than burning -- crushing, for example. Total wood utilization is improving and this means less need for slash disposal in the future, by burning or any other method. (Author conclusions)

16419 APTIC NO. 34964

ODonnell, A. and A. Dravnieks

CHEMICAL SPECIES IN ENGINE EXHAUST AND THEIR CONTRIBUTIONS TO EXHAUST ODORS. *IIT Research Inst., Chicago, Ill., Rept. IITRI C6183-5, 81p., Nov. 1970. 10 refs.*

NTIS: PB 198072

The nature of odorous species in the exhaust from a Detroit Diesel Engine Division 6V-71N, operated at constant load and fuel conditions, was investigated using high-resolution two column gas chromatography, mass spectrometry on resolved species, and sensory observations. Solid adsorbent collection devices were used to sample from a nitrogen-diluted exhaust stream. Although the presence of many hundred of compounds was indicated by the chromatograms, only a small fraction were found to exhibit distinct odors at concentrations encountered in the exhaust. The major concentration species, the paraffinic hydrocarbons, are individually non-odorous. The odor-relevant species are polar, and many exhibit low odor thresholds, occurring in the exhaust in relatively small concentrations. From mass spectral data, a variety of compound types was found among the more important odor contributors including: aliphatic aldehydes, aliphatic compounds with more that one position of unsaturation, alkyl derivatives of benzene, indan, tetralin, and naphthalene, aldehyde and ketone derivatives of benzene and alkylbenzenes, and sulfur species. Auxiliary gas chromatographic methods suggest that aliphatic acids are also odor relevant. (Author abstract modified)

16420 APTIC NO. 34904

Ohigashi, Shunichi and Yoshisuke Hamamoto

CYLINDER GAS COMPOSITION OF SMALL 2-STROKE CYCLE GASOLINE ENGINE. *Preprint, Society of Automotive Engineers, Inc., New York, 16p., 1971. 5 refs. (Presented at the Automotive Engineering Congress, Detroit, Mich., Jan. 11-15, 1971, Paper 710143.)*

Compositions of cylinder gas and exhaust gas were investigated in a two-stroke cycle crankcase-scavanged gasoline engine by analysis of the sampled gas extracted from the cylinder and exhaust pipe. The combustion process taking place in a two-stroke cycle gasoline engine has cycle-by-cycle variations. A new method controlling the operation of the sampling valve was applied which enabled the selection of cycles showing the same peak pressure and extraction of a combustion gas produced by the similar combustion process. The composition of the combustion gas in the cylinder is approximately in agreement with the calculated values, but there were severe fluctations in the concentration of each component. In rich mixtures, the gas composition after combustion is not affected by the scavenging efficiency. Irrespective of air-fuel ratio, there remains approximately 0.5% oxygen after combustion in rich mixtures; in lean mixtures, approximately 0.3% carbon monoxide is produced. The most reliable values estimating the scavenging properties may be calculated from the change of 02 concentrations of sampled gases before and after scavenging. It is necessary to select the gas sampling cycle by the cylinder pressure, because the scavenging process is affected by the combustion process in the preceding cycle. No remarkable uneven local composition is observed at the time of spark ignition. (Author abstract modified)

16421 APTIC NO. 34601

Organ, A. J.

THE STIRLING CYCLE ENGINE -- A POSSIBLE ANSWER TO ATMOSPHERIC POLLUTION? Environ. Eng., 1971:9-15, Sept. 1971. 42 refs. (Presented to the Society of Environmental Engineers, London, England, Nov. 11, 1970.)

Legislation recently introduced in the United States to control vehicle exhaust emissions is cited. California exhaust control standards are given for hydrocarbons, carbon monoxide, crankcase emissions, fuel evaporation, and oxides of nitrogen. The nature of the problem of atmospheric pollution by automobiles is briefly reviewed, and the shortcomings of the internal combustion engine identified. Different engine cycles cause varying amounts of pollution. Alternative prime movers are examined for suitability as substitutes for the internal combustion engine. They include electric power, steam engines, nuclear power, and gas turbines. Attention is focused on the external combustion class of engine. The Stirling cycle engine has an inherently high thermal efficiency, the ability to operate from any source of high grade thermal energy, and is essentially free from vibration and noise. In conjunction with a suitable hydraulic transmission system, such a device could have many practical advantages as a prime mover for road vehicle propulsion, in addition to having exhaust emission characteristics well within emission limits currently in force. The Stirling cycle works on a closed, regenerative cycle in other words there is no inlet and no exhaust, and the same working fluid (air, hydrogen, or helium) is used over and over again.

16422 APTIC NO. 34608

Plust, H. G.

PROBLEMS OF ELECTRIC DRIVES FOR STREET VEHICLES. PART II. *(Aktuelle Probleme bei elektrischen Antriebssystemen fuer Strassenfahrzeuge Teil 2). Text in German. Automobiltech. Z. (Stuttgart), 73(11):428-432, Nov, 1971. 150 refs. Part I. Ibid., 73(9):336-342, 1971.*

Development of the electric motor, the electronic control, and the charging device has been basically completed; however, the efficiency has to be increased and the price reduced. The construction of experimental vehicles will help in this respect, so that it will soon be feasible to construct the electric drive with about 2 kg/kW. Less precise forecasts can be made concerning the energy source. Fuel cells belong to the remote future, if they can be used at all; however, prototypes of metal/air batteries will be available in a few years. Sodium sulfur batteries will soon go on trial operation. Through the use of synthetics, the vehicle weight can be reduced by 8 to 10%, so that within the next 5 to 10 years, commercial vehicles with electric drives are feasible. The combustion engine/battery hybrid system is considered the best interim solution. The price for such vehicles will certainly be higher than that of conventional ones. But the higher life time will at least to some extent compensate for this. No prognoses concerning electric automobiles for passengers can yet be given. Japan and Europe have indicated that they will start production of certain electric automobiles for passengers in 1971. An opinion sample in the U. S. indicated that 50 million Americans would buy an electric automobile if it cost less than $2000.00.

16423 APTIC NO. 34559

Potter, J. H. and M. S. Nutkis

STUDY OF SMOKE IN DIESEL ENGINE EXHAUST PRODUCTS. *Preprint, American Society of Mechanical Engineers, New York, 7p., 1971. 3 refs. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D. C., Nov. 28- Dec. 2, 1971, Paper 71WA/PID-4.)*

The levels of smoke emanating from a single-cylinder solid injection diesel engine were investigated with respect to the effects of speed, power output, economy, and exhaust temperature. The intensity of emitted smoke increased with load and became especially objectionable as rated load was exceeded. Spot filtering methods and smoke evaluation techniques were examined for efficiency and applicability. (Author abstract modified)

16424 APTIC NO. 34788

Proctor, Paul Dean and Thomas R. Beveridge

POPULATION, ENERGY, SELECTED MINERAL RAW MATERIALS, AND PERSONNEL DEMANDS, 2000 A. D. *Preprint, Society of Mining Engineers, AIME, N. Y., New York, N. Y., 19p., 1971. (Presented at the American Institute of Mining, Metallurgical, and Petroleum Engineers, Annual Meeting, New York, Feb. 26-March 4, 1971, Paper 71-H-107.)*

The people of the United States currently consume 32% of the world s energy and similarly large percentages of the world s mineral raw materials. A minimal two percent increase per year in the standard of living in the United States and a four percent increase elsewhere in the world, beyond the demands of the estimated population increases, suggest the magnitude of the increased need for energy-mineral raw materials and the possible crises the world will face in these areas by 2000 A.D. Iron ore, copper, lead, and zinc, sulfur, and fertilizer consumption and projections are considered. Better trained and increased manpower needs are also indicated.

16425 APTIC NO. 34492

Prowler, Millard E.

FIRES TO FIGHT, POLLUTANTS TO BURN. *Environ. Control Safety Management, 142(5):30-31, Nov. 1971.*

At the Naval Training Center in Orlando, Florida, sailors learn to combat fires under simulated shipboard conditions. Six-inch- deep pools of oil are set afire inside concrete burn rooms, and the fires are put out by student firemen. Prior to recent installation of incinerators to burn the pollutants, dense clouds of smoke rose into the sky during firefighting classes. Now, four incinerators effectively consume the hydrocarbon pollutants in the combustion gases. Each incinerator consists of a vertical stack with a custom-designed, automatically regulated, gas-fired burner at the base. Each of the cylindrical burners has a series of circumferentially mounted radial nozzles which direct flames toward the center of the burner. Fans direct horizontal air streams through the burners, forcing the flames into the stacks where pollutants are ignited and consumed. A special nozzle design and unique baffle arrangement allow large volumes of air to flow through the burners without blowing out the flames. Temperature controllers, draft sensors, and electronic smoke indicators are part of the installation.

16426 APTIC NO. 34341

Rossenbeck, Martin

FUEL MODIFICATIONS FOR THE PROTECTION OF THE ENVIRONMENT. *(Kraftstoffwandel im Zeichen des Umweltschutzes). Text in German. Automobiltech. (Stuttgart), 73(11):415-421, Nov. 1971. 62 refs.*

Tetraethyl lead has been used for more than 45 years all over the world as an anti-knock agent in gasoline for automobiles. The first country which limited the leat content was Sweden. The maximum allowable concentration has been reduced to 0.7 g/l (beginning with January 1, 1970) from 0.84 g/l. The Federal Republic of Germany has passed a law reducing the lead content to a maximum of 0.40 g/l beginnig with January 1, 1972 and to 0.15 g/l by January 1, 1976. The U. S. has no law yet for limiting the lead content. Lead is emitted in the combustion of hard coal in the form of lead oxide; in the vicinity of lead-working plants, lead has been found in larger concentrations (particle size: 0.5 to 5 micron). The main charactertistic of the lead compounds emitted by automobiles is the small particle size which is on the average less than 0.125 micron. Part of the inhaled or ingested lead is deposited in the bones and part in the blood. Lead is a toxin which interferes with the blood formation. A correlation exists between the lead content in the blood, in the urine, and in the air. The effect of lead on humans and their organs was studied for the first time by exposure to an atmosphere with constant lead concentrations for half a year. Initially, the lead content in the blood rose until it had reached a certain plateau. The limitation of the lead in gasoline will reduce the octane number from 100 to 98 for super gasoline and to 91 for normal gasoline. A reduction of 0.40 g lead/l should cause no trouble with most of the presently existing engines. For reduction to 0.15 g/l other anti-knock agents must be found.

16427 APTIC NO. 34524

Rylant, W. J. A.

FORECAST OF FUTURE AUTOMOBILES IN BELGIUM. *(Raming omtrent het toekomstige motorvoertuigenpark in Belgie). Text in Dutch. Ingenieursblad, 40(15-16):443-446, 1971. 8 refs.*

A number of methods are available for forecasting future automobiles in a given country. One method is to construct a curve of the number of automobiles vs. year and extrapolate to determine future automobiles. However, this does not include the growth of population. Hence, two ratios are used: automobile density i.e. the number of persons per automobile or the number of automobiles per 1000 inhabitants. Extrapolation of these numbers for future years gives a better forecast. This second method still has one disadvantage in that it does not include the welfare of the inhabitants (purchasing power). A relationship has previously been reported between the number of automobiles per 1000 people and the national income per head of a family. This third method is used to first estimate the national income per head of a family wherein the number of automobiles per 1000 people (from the relationship between automobile owners and national income per head of family) is included. The number of automobiles in any future year can then be calculated. Results are published for Belgium using the above method and compared with an earlier forecast by Hondermarcq. Regression analysis is used to arrive at the results. For the year 1980, the estimates are as follows: national income/head of family equals $2402; the number of automobiles/1000 inhabitants equals 340; and the number of automobiles equals 3.55 million. For the years 1990 and 1995, the number of automobiles in Belgium is 4.6 million and 5 million, respectively.

16428 APTIC NO. 34974

Schmidling, Joe

NON-AIR-POLLUTING GROVE HEATING. *Fla. Grow. Rancher, 64(10):5, 16, Oct. 1971.*

The rules of the Florida Department of Pollution Control cite that, as of June 1974, the department will not approve any outdoor heating device which emits more than five-tenths gram per minute of unconsumed solid carbonaceous matter or particulate matter. A system with spot heaters is described which protects citrus groves during the winter freeze. One of the advantages of the spot heater system is that it can be used to convert any approved heater to an automatic heating system. In the grove described, underground lines, riser groups, and above-ground flexible plastic lines feed eight heaters on a string up to 400 feet. It takes three men two hours to light approximately 1200 heaters with a butane torch.

16429 APTIC NO. 34923

Schwartz, Harvey J.

SPACE TECHNOLOGY APPLICABLE TO HYBRID VEHICLE BATTERIES. *Preprint, Society of Automotive Engineers, Inc., New York, 7p., 1971. 10 refs. (Presented at the Society of Automotive Engineers, Intersociety Energy Conversion Engineering Conference, Boston, Mass., Aug. 3-6, 1971.)*

NTIS: N71-24617

Hybrid heat engine/electric systems are one of several classes of hybrid systems being considered as a near term power train for a low-pollutant vehicle. While the lead acid battery can be improved, the resulting vehicle would still have a performance below the target level. Successful development of a nickel-zinc battery could produce a full-performance hybrid car for the post-1975 time period. Examples of aerospace battery technology are presented which could increase the life of nickel-zinc batteries to a point where they become attractive candidates for hybrid vehicle use. Three problems have been identified which bear on zinc electrode life: dendrite growth, shape change, and separator degradation. (Author abstract modified)

16430 APTIC NO. 34596

Short, W.

POLLUTION PROBLEMS FROM WASTE INCINERATION AND POSSIBLE REMEDIES. *Clean Air, 1(1):20-25, Spring 1971. 1 ref. (Presented at the Scottish Clean Air Conference, 1970.)*

For designing combustion appliances satisfactorily, the design engineer should know as much about the fuel (refuse) he is to use as he possibly can. The two most important factors are weight of material and its calorific value. Material density and composition are also important, but to a slightly lesser degree. From a knowledge of the material being processed, the minimum residual material can be predicted. The minimum standards which can be reasonably applied to the residue are that it can be tipped without becoming malodorous, causing water pollution, or feeding living organisms. Samples were collected and examined by both gas chromatography and mass spectrometry to determine the noxious gases emitted from incineration of plastic and chlorinated plastic sheets. Hot gases must be cooled if they are to be cleaned efficiently, since cyclone arrestors (or electrostatic precipitators for large units) have limiting temperatures. Effective stack heights and the dispersal of gases are mentioned. The thermal plume can be influenced by temperatures of gases, velocity of gases, mass of gases, and height. Sludge treatment and the incineration of special wastes are discussed.

16431 APTIC NO. 35001

Sisson, William

DETERMINING SULFUR DIOXIDE EMISSIONS. *Pollut. Eng., 3(6):21, Nov./Dec. 1971.*

By knowing the sulfur content of the fuel (expressed as weight percent of fuel), the heating value in Btu/lb and the Btu s burned, the amount of sulfur dioxide which will be emitted to the atmosphere can be calculated. An example is cited.

16432 APTIC NO. 34891

Springer, Karl J.

BASELINE EXHAUST EMISSIONS FROM U. S. ARMY M54A2 LDS 465 POWERED FIVE-TON TRUCKS. (FINAL REPORT). *Southwest Research Inst., San Antonio, Tex., Army Materiel Command Contract DAAD05-67-C-0361–Modification P008, Rept. Ar-690, 36p., April 30, 1969. 14 refs.*

NTIS, DDC: AD 722832

Baseline exhaust emissions data were obtained as part of a 20,000-mile test of lubricant oils in four M54A2 five-ton Army trucks powered by the LDS 465 turbocharged, four-cycle, compression ignition engine. These emissions included odor, smoke, and chemical/instrumental measurements of total unburned hydrocarbons, carbon monoxide, carbon dioxide, oxides of nitrogen, nitric oxide, total aliphatic aldehydes, formaldehyde, acrolein, and sulfur dioxide using the latest techniques available. Power checks as well as emissions were obtained at the beginning, end, and at about 6500 and 12,000 miles duration. The effects of vehicle operating condition and test mileage are presented as part of the analysis of the results. Typical data for two widely used, commercial truck-tractors powered by four-cycle, naturally aspirated and turbocharged engines are indicated to place the military truck emissions in perspective. Limited back-to-back type operation of two vehicles on a commercial barium smoke suppressant fuel additive was conducted periodically and the constant and transient smoke results are presented. (Author abstract)

16433 APTIC NO. 34754

Stock, Alfred and Friedrich Cucuel

THE OCCURRENCE OF MERCURY. *(Die Verbreitung des Quecksilbers). Text in German. Naturwissenschaften (Berlin), vol. 22:390-393, 1934. 9 refs.*

The mercury trace content of many inorganic and organic substances was determined by highly sensitive analytical methods. In most cases mercury was isolated by heating pulverized material in a porcelain tube to 800 C for several hours and by condensing the mercury vapors in a U-shaped absorption bulb. The mercury was dissolved in chlorinated water and electrolytically precipitated on copper wire. From materials which yield interferring distillates, mercury was solubilized by a potassium chlorate-hydrochloric acid solution. The trace quantities of mercury found in some of the tested materials were: rocks (granite, syenite), 2.1 gamma; slate, 48 gamma; humus soil, 3-81 gamma; fossil coal, 0.8-2.2 gamma; spring water, 0.01-0.05 gamma; rain water, 0.05-0.48 gamma; lettuce, 0.9 gamma; dried beans, 4.6 gamma; pork, 0.6 gamma; calf s liver, 2 gamma; and fish, 2.4-19 gamma. Humans ingest approximately 5 gamma Hg every day in meals. Thus traces of mercury are ubiguitous, approximately in the order of magnitude of 0.00000001 g which is due to its great volatility which sets mercury from other metals. It is possible that mercury plays a biological role and that, like iron, it is one of the catalytic elements.

16434 APTIC NO. 34728

Suzuki, Takeo, Toshiichi Okita, and Hiroshi Yamamoto

DATA FOR ENVIRONMENTAL STANDARD OF NITROGEN OXIDES. *(Chisso no sankabutsu no kankyo kijun ni kansuru shiryo). Text in Japanese. 183p., April 1971. 132 refs.*

Air pollution by nitrogen oxides is discussed. Methods for determination include the Griss-Saltzman method, the Jacobs Hochhiser method, gas chromatography, correlation spectrometry, electrochemical oxidation and reduction, and the chemiluminescent method. The influence of nitrogen oxides on experimental animals and human bodies and epidemiological studies are discussed. Environmental standards are given for nitrogen oxides in nine countries and for photochemically reactive substances in four countries. Air pollution by photochemical reactions are mentioned. The determination methods for photochemically reactive substances include oxidant determination by the phenolphthalin, gum cracking, radioactive ethylene compound, mercury vapor reaction, radioactive clathrate, enzyme reaction, colorimetry with an olefin reaction, ammonium sulfate and sulfate of iron, chemiluminescent, ethylene, infrared absorption, and ultraviolet absorption methods. Peroxyacetyl nitrate can be analyzed by long wave infrared spectrometry and gas chromatography. The influence of photochemically reactive substances are discussed, including that of ozone, oxidants, and PAN on the living body and the influence of photochemical oxidants and nitric oxide or nitrogen dioxide on plants.

16435 APTIC NO. 34694

Thompson, T. J.

ROLE OF NUCLEAR POWER IN THE UNITED STATES OF AMERICA. *International Atomic Energy Agency, Vienna (Austria) and Atomic Energy Commission, Washington, D. C. Symp. Environ. Aspects Nucl. Power Stations, New York, 1970, p. 91-116. 32 refs. (Aug. 10-14, Paper 146/4.)*

Continued development and growth of nuclear power is destined to play a prominent part in easing the problems a burgeoning population and industrial development have produced. Today, over 100 commercial nuclear electric generating plants are in operation, under construction, or planned. Nuclear power as a source of energy has the potential of extending our available resources of hydrocarbon fuels and permitting their use for unique applications. It also acts as a competitive spur to encourage coal production and transportation industries to reduce costs. Emphasis is being given to the need for breeder reactors to extend resources of nuclear materials greatly beyond limits set by present-type reactors. Potential contributions of nuclear power to environmental control will include not only the inherent pollution-free aspects of nuclear power but also the availability of low-cost nuclear power to meet the substantial energy requirements for environmental control. (Author abstract modified)

16436 APTIC NO. 35029

Tomioka, Kaoru

POSITION OF PETROLEUM AS ENERGY SOURCE. *(Enerugigen to shite no sekiyu no chii). Text in Japanese. Kankyo Sozo (Environ. Creation), 1(4):39-42, Nov. 1971.*

The total energy consumption in Japan in 1959 was 72,520,000 kl and in 1969 was 250,130,000 kl, showing a 340% increase, converted into oil. In 1959, 32.7% of the total fuel demand was supplied by oil, whereas 68.3% was supplied in 1969. The total Japanese energy demand in 1975, converted into petroleum will be 438,500,000 kl, and in 1985, 933,300,000 kl to 1,028,900,000 kl. All these prospectives require some measures of decreasing sulfur content in the fuel, both by importing crude oil with low sulfur content and by developing desulfurization techniques. By refining crude petroleum, 55% heavy oil is produced, and the amount of production in 1969 was 92,880,000. In 1973, densely populated areas with the 0.27 ppm sulfur threshold will require 43,600,000 kl of 0.9% sulfur containing oil; polluted areas with 0.20 ppm sulfur threshold will require 28,300,000 kl of 1.3% sulfur content fuel; the area requiring preventive measures against pollution, in order to keep the 0.20 ppm pollution threshold, will require 27,400,000 kl of oil with 1.45% sulfur content. Electric power industries which consume more than 30% of the total oil consumption use partially desulfurized oil by boiling and are investing in developing desulfurization techniques. Boiling of crude oil is an effective and economical method of lowering sulfur content; but the amount of oil that can be desulfurized by this method is limited by law. Desulfurization of stack gas is also used most purposefully by electric power industries using active manganese and activated carbon catalysts.

16437 APTIC NO. 34434

Wadman, Bruce

LNG-FUELED--IS THIS THE MOST PRACTICAL WAY TO MINIMIZE TRANSIT BUS EXHAUST EMISSIONS? Diesel Gas Turbine Progr., 37(10):36-37, Oct. 1971.

Conversion of transit-type diesel buses to liquefied natural gas (LNG) may be the most effective approach to controlling bus exhaust emissions in crowded urban areas. A V-903 diesel converted to natural gas operation and derated from its normal 320 hp diesel rating to 235 hp at 2600 rpm has clean, low odor exhaust with reduced carbon monoxide and nitrogen oxide concentrations. In addition, the engine may be below the five grams/bhp/hr proposed 1975 standards for hydrocarbons plus nitrogen oxides. A small heat exchanger converts the LNG to the gaseous state with engine cooling water. Changes to the engine include cylinder heads to accept spark plugs at locations where fuel injection nozzles are normally used; new pistons for low compression ratio operation; special intake manifolding for dual Impco carburetors; and solid-state ignition. The LNG arrangements cost about five percent more initially than for a similar diesel bus, but production volume should reduce the cost.

16438 APTIC NO. 34827

Wallace, Robin A., William Fulkerson, Wilbur D. Shults, and William S. Lyon

MERCURY IN THE ENVIRONMENT. THE HUMAN ELEMENT. *Oak Ridge National Lab., Tenn., National Science Foundation Interagency Agreement AAA-R-4-79, 61p., March 1971. 281 refs.*

NTIS: ORNL-NSF-EP-1

Numerous aspects of environmental mercury are reviewed including: flow of Hg in the U. S. during 1968; man-made and natural sources; environmental and biological levels; forms and transformation of Hg in the environment; turnover, translocation, and accumulation in plants and animals; criteria for evaluating Hg levels, including human toxicity; existing standards and tolerance limits in air, water, and food; physical and chemical properties; analytical methodology; the mercury cell chlor-alkali process; and recommendations for future work. The most important man-made sources of environmental Hg in the U. S. are chlor-alkali plants, seed-dressing agents, smelting operations, and fossil fuel combustion; the principal natural sources are the land mass itself and geothermal processes. The social implications of current use practices must be more intensively considered, and improved recycling and industrial technology must be developed.

16439 APTIC NO. 34424

Weiss, Herbert V., Minoru Koide, and Edward D. Goldberg

MERCURY IN A GREENLAND ICE SHEET: EVIDENCE OF RECENT INPUT BY MAN. *Science, 174(4010):692-694, Nov. 1971. 11 refs.*

Neutron activation analysis of glacial ice from Greenland revealed significantly higher rates of mercury deposition in recent years. Samples from waters deposited prior to 1952 had from 30 to 75 ng mercury/kg of water with an average value of 60 + or 17. The mercury concentration in waters deposited between 1952 and 1965 averaged 125 + or 52 ng/kg of water with a range between 87 and 230. The background concentration of mercury in the atmosphere appears to result from the degassing of the terrestrial upper mantle and lower crust. Increased fluxes of mercury to the atmosphere may be the result of human activities that enhance the degassing process by increasing the exposure of crustal materials. Industrial activities that release significant quantities of mercury to the atmosphere are chloralkali production, fossil-fuel combustion, cement production, and the roasting of sulfide ores.

16440 APTIC NO. 34350

Wolff, Josef

INTEGRATION PROBLEMS OF TRAFFIC AND TOURISM. PRESENT SITUATION AND DEVELOPMENT. *(Integrationsprobleme in Verkehr und Touristik. Derzeitige Situation und Entwicklung). Text in German. Tech. Ueberwach. (Duesseldorf), 12(11):318-325, Nov. 1971.*

Traffic is one of the major polluters of the environment. The emissions by automobiles must be divided into gaseous combustion products, fuel losses, tire abrasions, and old oil. By 1980, 21.5 million automobiles will consume 30 million tons of fuel per year. The efforts by the automobile industry and the federal government of the Federal Republic of Germany are directed toward improvement of the old vehicles and novel construction for the new cars. Through such measures emissions can be cut by 50%. Further research concerning the biomedical influence of gas components such as hydrocarbons, carbon monoxide, nitric oxide and lead will be necessary. An exhaust gas monitoring station has been established in Essen and other parts of the country.

16441 APTIC NO. 34874

Wouk, Victor

THE ELECTRIC CAR AND THE PETROLEUM CHEMICAL INDUSTRY: BOON OR BANE? TREAT OR THREAT? Preprint, Inst. of Electrical and Electronics Engineers, New York, 16p., 1970. 8 refs. (Presented at the Institute of Electrical and Electronics Engineers, Industry Conference, Annual, 17th, Tulsa, Okla., Sept. 14-16, 1970, Paper PCI-70-18.)

With the present state of battery and fuel cell technology, the all-electric automobile is not viable in the immediate future. However, the heat engine/battery hybrid that is possible with present technology provides hope for a low-emission vehicle. In this concept a small petroleum-fueled engine drives an electric generator that replaces the energy drawn from the batteries during driving and acceleration. When the vehicle is operating on batteries alone, there are no emissions. When the engine-generator set is operating, it operates at optimum tuning so emissions are at the lowest level possible, consistent with load requirements. The hybrid will allow for the gradual evolution of the all-electric drive with minimum disruption of the petroleum industry, the automobile industry, and the electric power industry.

16442 APTIC NO. 34438

Wright, J. H.

POWER AND THE ENVIRONMENT. *Proc. Am. Power Conf., vol. 32, 1970, p. 487-498. 15 refs.*

Nuclear pressurized-water steam electric power plants emit radionuclides to the air and water environment; fossil-fuel power plants emit particulates, nitrogen oxides, sulfur oxides, hydrocarbons, and carbon monoxide to the atmosphere. Both types of plants add heat to waterways. However, there is ample evidence that steam electric generating systems can be constructed and operated with minimal harmful impact on the natural environment. The anticipated total body radiation exposure to the general public from a nuclear plants is well within the Atomic Energy Commission emission limit and the Federal Radiation Exposure limit of 500 mrem/yr at a plant boundary. The AEC limits provide a built-in automatic exposure reduction factor of approximately 20-50% below FRC limits. The impact of heat discharges on aquatic life is being circumvented by use of such heat dissipation methods as evaporative cooling towers, dry cooling towers, and cooling ponds. Emission standards equivalent to the radiological emission standards are needed for individual air pollutants. Effective methods exist for control of particulate emissions, and the dolomite system for sulfur dioxide control is being tested on operating fossil-fuel power plants. Significant reductions in nitrogen oxides emission can be expected with new combustion processes. The discharge of heat and carbon dioxide can effect the temperature of the atmosphere. Contaminants can reduce transmission of the sun s heat to earth.

CONTROL METHODS

16443 APTIC NO. 34317

ENVIRONMENT PROTECTION CITATIONS. *Power, 115(11):S2-S9, Nov. 1971.*

Industrial plants that proved how sound engineering could produce results in a determined effort to clean up plant-water effluent are cited. Mathematical modelling was utilized by International Paper to evaluate the influence of waste discharge into a lake. Starting with the basic equation for distribution of a contaminant under steady-state conditions, a series of equations were developed for use with a computer program to yield, amongst other variables, biological oxygen demand and dissolved oxygen profiles for the lake. The pollution-free operation for a new mill with a continuous digester using the proven kraft process is described. An ash collector and the sulfite pulping process are mentioned. Activated sludge, tertiary treatment, and incineration are described for the control of refinery problems. Waste waters are collected in sumps at key locations, then pumped to treatment tanks. Chrome is reduced with sodium bisulfite and precipitated with caustic, and cyanide is oxidized with sodium hypochlorite. Treated solutions are pumped to blending tanks where the pH is adjusted. Waste streams containing suspended solids, hexavalent chrome, and floating matter are treated with antifoam and coagulating agents before entering an air mixing tank. After aeration, waste water flows to a series of settling tanks where suspended and floating solids are removed. The recently started-up purification plant to handle acidic rinse water plus wastes from chrome plating is also described. Other control methods mentioned include black liquor oxidation, electrostatic precipitators, odor counteraction, venturi scrubbers, cyclones, and filters.

16444 APTIC NO. 34338

CENTRIFUGAL DUST COLLECTOR. *(Fliehkraft-Staubabscheider). Text in German. Wasser, Luft Betrieb, 15(11):A33, Nov. 1971.*

For increasing the collection efficiency of centrifugal separators, the installation of a cyclone head with a ring of inflow guide vanes and a central tube is recommended at the end of each centrifugal tube of a double cyclone. A tangential dust tap-off tube should be installed jointly for both sinks in the center of the jacket of the centrifugal tube. A rotary movement is imparted on the flow at the passage of the dust-laden air through the guide vane rings. The dust is thrown toward the wall through the centrifugal force. The dust falls along the wall toward the central section where the two vortices meet. Here the dust is drawn off. The turbulence from this process has the least influence on the dust separation process through this design.

16445 APTIC NO. 34362

OXIDE INJECTION HALTS EMISSION: ENGLISH PROCESS REDUCES FUMES IN STEELMAKING. *Iron Age, Nov. 26, 1970, p. 41.*

An English process eliminates the brown fume normally associated with oxygen lancing through injection of a powdered metal oxide into a liquid steel bath. The result is a vigorous carbon boil and the carbon removal rate is sufficient to ensure reduction of hydrogen and nitrogen content. Chromium and manganese contents can also be reduced by promoting a low-temperature boil. The powder can be any type of iron oxide: crushed millscale, ore concentrates, or fines. If powdered lime is used with the millscale, it is also possible to remove phosphorus. The process has been successfully used on 120-ton arc furnaces, 250-ton open-hearth furnaces, and 600-ton active hot-metal mixers.

16446 APTIC NO. 34365

POLLUTION DEVICE READY FOR 74 AUTOS. *Am. City, 84(11):46-47, Nov. 1971.*

A new automobile engine exhaust purifier reduces hydrocarbon and carbon monoxide emissions to levels required by the 1975 Environmental Protection Agency standards. The reductions are maintained for 50,000 miles, as specified by EPA. The purifier consists of a platinum catalyst on a ceramic honeycomb and is installed between the manifold and standard muffler. The device is effective with propane, natural gas, diesel fuel, and unleaded gasoline. The mass-produced purifier will add less than $50/car.

16447 APTIC NO. 34416

FLY ASH CONTROL BY CYCLONIC SCRUBBER. *Mater. Reclamation Weekly, Oct. 16, 1971:31.*

A cyclonic gas scrubber with a jet spray box reduces excessive output of fly ash from incinerators and furnaces. Dirty gases enter at the bottom of the cyclone, are cleaned by water droplets of the required fineness, and emerge at the top with 98% of their particulate impurities removed. A sludge of water/ash mixture drains off at the bottom. The equipment conforms to all clean air legislation and antipollution laws.

16448 APTIC NO. 33430

Bureau of Mines, Washington, D. C.

CONTROL OF SULFUR OXIDE EMISSIONS IN COPPER, LEAD, AND ZINC SMELTING. *Bureau of Mines Information Circ., no. 8527, 62p., 1971. 6 refs.*

The problems involved in achieving various degrees of control over smelter sulfur oxide emissions are evaluated, as well as the technology available to accomplish the task of assuring clean air. The estimated cost of compliance with Federal standards is reviewed for the copper, zinc, and lead industries, but principal attention is given to the copper situation. Production statistics and practices are reviewed and air pollution regulations are cited. Currently, there are three methods in use for reducing the sulfur dioxide concentration in the atmosphere surrounding a smelter. They are the tall stack, the tall stack coupled with a contact sulfuric acid plant, and closed-loop control. The contact sulfuric acid process, the Cominco absorption process, the Asarco process for producing elemental sulfur, the lime wet-scrubbing process, and the limestone wet-scrubbing process are described. A citrate absorption process is currently under development. Both economic and noneconomic factors, such as geographic location, nearness of markets for sulfurous products, available land for product disposal, and potential water pollution problems will influence the choice of method for controlling emissions.

16449 APTIC NO. 34459

DEVELOPMENTS IN AIR POLLUTION CONTROL TECHNIQUES FOR PULP INDUSTRY. *(Luftvardsteknik i utveckling for en renare skogsindustri). Text in Swedish. Svensk Papperstid. (Stockholm), 71(18):579-584, Sept. 1971.*

Air pollution problems and control of the Finnish pulp industry are discussed. An emission test group was formed in Sweden to furnish data on hydrogen sulfide and sulfur dioxide emissions by sulfate plants. Sampling, analysis, and sample handling methods are reviewed. The test data serve as a basis for the Nature Conservation Authority in determining standard values for soda plant emissions. Technical conditions of observing H2S emission norms are outlined. Emission measurements are remunerative, as they can contribute to a smoother operation. Three methods were tried to reduce SO2 emission in pulp production (changeover to another base (magnesium), waste gas scrubbing, and precipitation). Test instruments for measuring gaseous sulfur compound emissions around sulfate plants, and two methods for concentration measurements in ppb-range are reviewed. Local emission measurements around three sulfate plants are summarized. With smaller production volume, approximately the same amount of sulfur is emitted by the Finnish pulp industry as by the Swedish. Methods for continuous H2S and SO2 measurements are being studied and developed. It will be possible to reduce sulfite emission by changing over to another base connected with a more intensive regeneration of chemicals. Direct waste gas evaporators cannot meet the requirements in the sulfate cellulose industry. Electrostatic precipitators, and waste gas scrubbers are needed.

16450 APTIC NO. 34465

POLLUTION CONTROL PROGRESS. INDUSTRIAL CASE STUDIES. *J. Air Pollution Control Assoc., 21(11):728-730, 738, Nov. 1971.*

Successful case studies of pollution control in industrial emission sources are reviewed. Odor, emitted by condensation products from oils and pitch condensates from wood chips, in a hardboard tempering plant was controlled by fume incineration treatment; heat recovered from the process was used to preheat the incoming contaminated gas prior to incineration, resulting in a 60% saving in fuel. Emissions from electric power plants were controlled by conversion from coal to butane/propane fired boilers and by a filtering system to eliminate fly ash. A portable sprinkler system to control fly ash collected by precipitators on electric generating station grounds was nearly 100% effective in preventing stored fly ash from being windborne. Coke ovens designed for smoke control and automated fume control systems for electric arc furnaces controlled emission from steel plants. A scrubbing system, consisting of a dry cyclone collector, a wet scrubber, and a mist eliminator, was used effectively in a coal preparation plant. Conversion of conventional sulfuric acid plants to the double contact process effectively reduced sulfur dioxide emissions and increased recovery capacity. An incinerator unit was used to dispose of residual tar fractions (fly ash and airborne solids) from a phenol plant. Plasticizer emissions from the flooring operations of a cork industry were controlled by mist eliminator elements.

16451 APTIC NO. 34498

MEASUREMENT AND CONTROL IN CEMENT FACTORIES AND RELATED PLANTS. PART 4--ROTARY KILNS AND SHAFT KILNS (B). *Test., Instrum. Controls, 6(7):9-21, July 1969.*

The many possibilities of applying instrumentation and control technology to rotary kilns and shaft kilns in cement factories and related plants are discussed. The flow of primary air is easy to measure provided this is taken into consideration already at the time the plant is installed and sufficient space is reserved for the measuring device. Suggestions to control the flow of primary air or to install a proportional control for primary air/fuel feed are considered. Measuring and control of the primary air pressure and the primary air temperature are indicated. Gravimetric proportioning is cited in coal dust firing, while proper monitoring of oil firing requires flow measurement, flow control, pressure measurement, and temperature and viscosity control. Monitoring of gas firing is also indicated. Control circuit combinations are discussed. In the case of shaft kilns, the most important operating variable is the draught, which exceeds the importance of the waste gas flow of rotary kilns. Monitoring controls are recommended in particular for determining the locations of the sintering zone which can become abnormal in two respects: it can shift in its totality towards the top or bottom, but it can also tilt, which the production engineer calls skew burning.

16452 APTIC NO. 34562

COAL CAN YIELD LOW-SULFUR FUEL OIL. *Oil Gas J., 68(42): 98, Oct. 19, 1970.*

Products ranging from low-sulfur fuel to gasoline feedstocks can be made from high-sulfur coals using an ebullated-bed reactor system. In addition to the production of fuel oil, varying amounts of crude naphtha are produced, which can be reformed to yield gasoline blending stock with superior properties. Sulfur and nitrogen are removed from the coal and produced as sulfur and ammonia. Ash and small amounts of unconverted coal are separated from the fuel oil partially or completely by filtration or other mechanical means. Hydrogen production facilities are provided.

16453 APTIC NO. 34569

DUST COLLECTION AT DRYING STATIONS FOR SUGAR BEET SLICES. *(Entstaubung von Schnitzeltrocknungsanlagen). Text in German. Zucker, 24(19):613, 1971.*

The problem of dust collection at drying stations for beet slices was studied. The physical and chemical properties of the dust were determined. The measurements of the dust content were carried out according to VDI-standard 2066, and the grain size determination was carried out according to VDI guideline 2031. The dust concentration depended on the size of the dryer, the capacity, the quality of the product, and the mode of operation. In each individual case cyclones proved to be the most suitable dust collector. The first cyclone dust collection plant reached collection efficiencies of 98.8 to 99.1%. The dust concentration in the cleaned gas was 108 to 133 mg/cu m.

16454 APTIC NO. 34576

EXHAUST HEAT REACTOR BY DU PONT. *(Auspuff-Waermereaktor von Du Pont). Text in German. Motortech. Z. (Stuttgart), 32(11):441, Nov. 1971.*

The Du Pont company carried out experiments with a mechanical unit for reduction of the hydrocarbon and carbon monoxide concentration in exhaust gases. The unit is called exhaust heat reactor and operates on the principle of heat exchange. The unit consists of an outer jacket which accommodates a tubular hot center. The exhaust gases mixed with air enter directly into this hot tube. The hydrocarbons and carbon monoxide are thermally decomposed to carbon dioxide and water. The construction of the unit promotes the mixing of the gases and the initiation of the gases. The oxidation is completed prior to the exit of the waste gases. The unit has been tested in an eight cylinder engine for more than 160,000 km. The increase of the fuel consumption was negligible. The unit, in combination with waste gas recirculation for reduction of the oxides of nitrogen, reduced the pollutant emission to values lower than the limit values proposed for 1975.

16455 APTIC NO. 34605

NOTES. *(Notizen). Text in German. Chem. Rundschau (Solothurn), 24(42):1091, Oct. 20, 1971.*

A new highly resistant filter entirely made of activated coal has been developed for cleaning waste gases. The filter is prepared by rolling a synthetic tissue (rayon) slowly over wooden rollers into a bath with chemicals. This makes the material more absorbent. Next the tissue is put into an electric oven heated to 800 or 900 C. Here all chemical components in the tissue are carbonized with the exception of the long chain of C-atoms which form the skeleton of the tissue. Finally the tissue is exposed to water vapor and carbon dioxide which makes it more active. An experimental filter has an hourly capacity of 4 sq m. The filter can be used for cleaning waste gases of a chemical plant; also, the vapors from restaurants and large kitchens can be neutralized. A low-cost smoke density measuring unit has been developed. It comprises a monitor, a light beam projector as well as a photocell receiver. Projector and receiver can be mounted to the stack of a factory. The light beam interruption is converted into an electric current in dependence of the smoke density. An electrostatic precipitator has been developed which combines high voltage and continuous humidification with the effects of a centrifugal scavenger. Models with an hourly capacity of 8000, 16,000, and 32,000 cu m smoke or gas with temperatures of up to 400 C are available. Experiments have shown that the filter removed 99.4% of the particles contained in gases developing in the combustion of rubber tires.

16456 APTIC NO. 34646

ELECTROSTATIC FILTER. *Chem. Process Eng., 52(1):15, Jan. 1971.*

Designed to suppress the emission of pollutants into the atmosphere, the Aeropur electrostatic filter, when coupled to industrial incinerators, boilers, dust extractors, and other similar equipment, eliminates the emission of smoke, and limits the release of harmful gases into the atmosphere. Dust-laden gases from the incinerator enter the Aeropur s tower base through an involute entry port, where they are directed by fixed helix to a spiral path ascension. A central mast mounted upon an insulator carries banks of electrodes having multipoints to permit the corona discharge to ionize the dust particles. The whole central mast assembly is at high negative potential, while the tower acts as the earth return; therefore the resultant charged particles are attracted to the side plates where water irrigation washes them to the tower base, and thence to a settling tank, where the agglomerate can then be removed. The filter can eliminate gases such as sulfur dioxide, sulfur trioxide, chlorine, and hydrochloric acid.

16457 APTIC NO. 34858

VDI (Verein Deutscher Ingenieure) Kommission Reinhaltung der Luft

CONTROL OF CO-EMISSION IN VEHICLES POWERED BY OTTO ENGINES. *(Begrenzung der Emission von Kohlenmonoxid bei Kraftfahrzeugen mit Ottomotoren). VDI (Ver. Deut. Ing.) Richtinien, no. 2282, 4p., May 1967. 12 refs. Translated from German. Israel Program for Scientific Translations, Jerusalem, 4p., May 1967.*

NTIS: TT 68-50469/14

Carbon monoxide emissions from Otto engines operating in urban traffic can be substantially reduced by proper adjustment of carburetor and ignition. Crankcase emissions can be reduced by devices connecting the crankcase vent with the air intake. Exhaust emissions can be reduced by devices facilitating the addition of secondary air to the exhaust: direct-flame afterburners, catalytic converters, manifold air-oxidation systems, and manifold air-injection systems. With a well-serviced and properly tuned engine, a CO emission of 4.5% can be maintained in the idling mode.

16458 APTIC NO. 34885

DIESEL FUEL COMPOSITION. *(Lubrizol Corp., Cleveland, Ohio) Brit. Pat. 1,126,787. 6p., Sept. 11, 1968. (Appl. July 22, 1966, 19 claims).*

A fuel additive for use in diesel engines producing black exhaust smoke is described which contains 0.1 to 5% by weight of a basic alkaline earth metal salt of an acidic phosphorized aliphatic or alkylaromatic hydrocarbon having a molecular weight of 150-48,000. The aliphatic hydrocarbons, especially polyisobutene, are preferred. The preferred alkaline earth metal is barium, especially barium oxide or hydroxide. The salt is prepared by carbonating a mixture of an acidic phosphorized aliphatic hydrocarbon, a promoter such as phenol or alkyl-substituted phenol, and an alkaline earth metal base. The carbonated mixture is then heated to remove any volatile constituents. A neutral, carbonated calcium sulfonate complex (0.01 to 5%) is also incorporated into the fuel and prepared by reacting a carbonated calcium sulfonate complex with a metal ratio of 1.1 to 8.0, with a calcium base in the presence of an oil-soluble calcium phenate and an aliphatic monohydric alcohol.

16459 APTIC NO. 34894

Purdue Univ., Lafayette, Ind. Industrial and Technical Information Service

AIR POLLUTION CONTROL: A PRACTICAL GUIDE TO INFORMATION SOURCES FOR BUSINESS, INDUSTRY, AND MUNICIPALITIES. *44p., April 1971. 271 refs.*

Over 270 references are compiled to periodical articles, books, governmental codes and agencies, and organizations concerned with air pollution control. The references are grouped under two main headings: General Information and Specific Industries. Included under the first are handbooks and manuals on control methods and articles on emission sources, measurement methods, control methods, legal and economic aspects, standard and criteria, and municipal incineration problems. Listed under the second heading is information on the pollution problems of specific industries. Abstracts are included for most items. Two appendices provide information on air pollution control laws and regulations applicable in Indiana and the activities of national control agencies.

16460 APTIC NO. 34975

Study Committee on Air Cleaning Apparatus Management Standards (Japan)

STUDIES ON MAINTENANCE AND OPERATION OF AIR CLEANING APPARATUS FOR AIR POLLUTION CONTROL. *(Taiki osen taisaku toshite no kuki seijo sochi no iji konri ni kansuru kenkyu). Text in Japanese. Kuki Seijo Clean Air -- J. Japan Air Cleaning Assoc., Tokyo), 9(4):32-54.*

On-site investigations were conducted on 10 buildings among the 50 buildings that were inspected in 1969, with questionnaires and detailed inspections. The placement of the outside air duct and the room air duct in most cases were poor, and they invariably had space problems for an ideal air maintenance. More than half the cases showed poor workmanship in the installation of air cleaners; yet most questionnaires indicated that there was no problem in maintenance. This revealed a general lack of interest on the part of the building managers, with the maintenance of air cleaners completely left in the hands of manufacturers or dealers. Prompt passing of design standards and maintenance standard laws are desired. Studies on the deterioration of performances of air cleaners were also made. The relationship between cumulative dust quantity and the weight increase was approximately directly proportionate. The loss of pressure fluctuated and was not necessarily proportionate to the increase of the collected dust weight. Daily collection rate fluctuated a great deal. With regard to one type of filter, it varied between 12 and 40%. The length of time before requiring the change of a filter varied 60 to 20 days. Follow-up investigations were given to two buildings; the auto-roll type filter in one building showed 20-25% collection rate as compared with 15-30% in the other; the electric precipitator in the second building showed a steady 100% collection rate. The pressure loss of the auto-roll filter increased steadily,zzzz dropping to one half in 50 days, but did not change after that.

16461 APTIC NO. 35004

NAOH SCRUBBING PROCESS MOST ATTRACTIVE FOR SMALL-SCALE SO2 POLLUTION ABATEMENT. *Brit. Chem. Eng., 16(1):7, 9, Jan. 1971. 1 ref.*

An assessment of the possible approaches to control sulfur dioxide emissions from small scale facilities has revealed that non-regenerative sodium hydroxide scrubbing needs lowest capital investment and the lowest total annual cost. There can be a savings for small scale boilers of around two cents/MMBtu by still using the locally available cheaper high sulfur fuels and meeting the extra cost of pollution control equipment rather than switching over to the use of low sulfur fuels at higher costs.

16462 APTIC NO. 34447

Archer, John S. and Paul Eisenklam

MULTISTAGE COMBUSTION OF RESIDUAL FUET 1: THE EFFECTS OF USING AIR OR STEAM FOR THE ATOMIZATION OF RESIDUAL FUEL OIL IN A HIGH INTENSITY FIRST STAGE GASIFIER. *J. Inst. Fuel, 43(357), Oct. 1970. 21 refs. (Presented at The Institute of Fuel and the Institution of Chemical Engineers, Symposium on Advances in Design and Operation of Process Furnaces and Fire Heaters, London, England, Jan 29, 1970.)*

Operating data on a pilot spray combustion chamber burning high vanadium content residual fuel oil are given. The use of steam instead of air in the atomization of residual fuel oil in a high intensity gasifier leads to considerable reduction in solid loading of the exhaust gas. Solid products from steam atomized gasification have a lower carbon:hydrogen ratio than those resulting from air atomization. The combustion gas compositions for both steam and air atomized conditions indicates nonattainment of water gas shift equilibrium and carbon formation within the 60 ms mean residence time of the gas in the chamber with fuel rich burning. The elements sodium, vanadium, sulfur, and nickel in the fuel oil show no tendency to form corrosive products under fuel rich burning with either steam or air atomization. (Author conclusions modified)

16463 APTIC NO. 34634

Archer, John S., Peter D. Grout, and Paul Eisenklam

MULTISTAGE COMBUSTION OF RESIDUAL FUEL OIL. PART 2: THE CHARACTERISTICS OF A SECOND STAGE COMBUSTION CHAMBER AND A TWO STAGE COMBUSTION SYSTEM. *J. Inst. Fuel, vol. 43:451-460, Nov. 1970. 11 refs. (Presented at the Institute of Fuel and Institution of Chemical Engineers, Symposium on Advances in Design and Operation of Process Furnaces and Fire Heater, London, England, Jan. 29, 1970.)*

The operating data from a second stage chamber in a two-stage combustion system are described. The chamber has an average residence time of 40 ms and its characteristics give equilibrium of the water gas shift reaction in gas temperature and composition. Solid loading of the exhaust gas is calculated from regression equations based on experimental results. For stoichiometric burning in the second stage, the solid loading can be reduced to less than 0.4% of thy fuel input. High temperature corrosion resulting from the higher oxides of sulfur and vanadium is absent. Stability analysis indicates that to avoid blow-out of the second stage not more than 62% of the calorific value of the oil can be removed by indirect interstage heat transfer. Deposits of various particles and soot was measured. (Author abstract)

16464 APTIC NO. 34995

Bascom, Roger C., Louis C. Broering, and David E. Wulfhorst

DESIGN FACTORS THAT AFFECT DIESEL EMISSIONS. *SAE (Soc. Automot. Engrs.) Spec. Pub., no. 365:40-54, June 1971. 39 refs.*

Although diesels, as a group, are a relatively small source of air pollutants, emission standards which limit emissions from diesels have been adopted by California and the federal government. Test procedures and instrumentation for measuring diesel emissions have been developed, and an understanding of how engine design parameters affect emissions is evolving. Smoke and carbon monoxide are primarily functions of fuel/air ratio. Smoke is also affected by injection timing, air motion, and fuel spray characteristics. Hydrocarbon emissions are most affected by details of injector design and matching of the spray geometry with the combustion chamber shape. Nitric oxide emissions are controlled by local oxygen availability in regions of high temperature and residence time at the high temperature. Retarded injection timing, rich local fuel/air ratios, lower mixing rates of fuel and air, lower compression ratio, and lower intake air temperature tend to reduce nitric oxide emissions but may increase smoke. Smoke suppressant additives, water induction, exhaust gas recirculation, and catalytic converters reduce one or more of the emissions but are less desirable than emissions control through engine modifications. (Author abstract)

16465 APTIC NO. 34668

Bastress, E. K., R. C. Baker, C. F. Robertson, R. D. Siegel, and G. E. Smith

ASSESSMENT OF AIRCRAFT EMISSION CONTROL TECHNOLOGY. *Northern Research and Engineering Corp., Cambridge, Mass., Office of Air Programs Contract 68-04-0011, NREC Rept. 1168-1, 197p., Sept. 1971. 118 refs.*

NTIS: PB 204878

Emission control of aircraft by engine, fuel, and ground operations modifications and the technology of emission measurements were investigated with respect to effectiveness and time and costs of implementation. Major emission constituents and aircraft sources included carbon dioxide, carbon monoxide, nitric oxide, nitrogen dioxide, total and reactive hydrocarbons, aldehydes, dry particulates, sulfur dioxide, smoke, and odors from engine exhaust, cranckase blow-by, power unit exhaust, fuel drainage, and evaporative emissions. Complete test data, evaluations, and result summary and analysis are included. Measurement techniques are mentioned.

16466 APTIC NO. 34618

Bernhart, A. P.

NOTES ON AIR POLLUTION: METEOROLOGY AND PLANNING. PART II. *Water Pollution Control (Toronto), 109(11):57-58, Nov. 1971.*

The importance of prevailing winds, sea breezes, and frequency of temperature inversions and photochemical reactions for town planning is summarized. In addition, requirements for an ideal metropolis are given, including the green areas needed for balance between carbon dioxide and oxygen. Comparison is made between costs and efficiencies of control equipment for dust particles, gaseous pollutants, and automotive emissions, and costs of a control program for Toronto are calculated. Control equipment considered includes gravity and inertial settling, chambers, cyclones, filters, electrostatic equipment, sonic equipment, scrubbers, and spray towers. Crankcase emission recirculation, carburetor and spark changes, air injection system, mufflers, engine modifications, and maintenance are discussed to control car emissions.

16467 APTIC NO. 34556

Bhatia, S. P.

REMOVAL OF ORGANIC SULPHUR FROM COAL GAS. *Can. J. Chem. Eng., 49(5):606-610, Oct. 1971. 6 refs. (Presented at the Canadian Chemical Engineering Conference, 20th, Sarnia, Ontario, Oct. 19-21, 1970.)*

Organic sulfur components present in coal gas containing 15-20% carbon monoxide were effectively converted to hydrogen sulfide over a nickel-molybdenum catalyst. The H2S was effectively adsorbed on an iron oxide bed. Removal of the organic sulfur compounds depended on the concentration of thiophene present. With very little thiophene (about 10 ppm), conversion of total organic sulfur was about 97% at 350 C after a single conversion treatment. With six-stage treatment at 350 psig, the final gas contained only 0.2 ppm total organic sulfur in the presence of 4.5% water vapor. The calorific value of the gas did not change materially and unsaturated compounds were partially hydrogenated. Oxygen disappeared completely. The technique might also be applicable to the removal of sulfur compounds from natural gas prior to steam reforming. (Author abstract modified)

16468 APTIC NO. 34733

Billard, F., G. Madelaine, and J. Pradel

THE EFFICIENCY OF FILTERS AS FUNCTION OF CLOGGING BY VARIOUS AEROSOLS TYPES. *(Variation de l efficacite des filtres en fonction de leur colmatage par divers types d aerosols). Text in French. Pollut. Radioact. Milieux Gazeux Proc. Symp., Saclay, France, 1963, p. 415-423. 6 refs. (Nov. 12-16.)*

Accelerated clogging of filters was investigated to determine the variation of effectiveness under different operating conditions. The efficiency of different paper filters did not vary significantly with the nature of particles. Efficiency increased with the use of atmospheric dusts and solid aerosols and decreased for tar and oil components. Efficiency of filter previously plugged with a solid aerosol decreased with atomization of an oil fog.

16469 APTIC NO. 34691

Billings, Charles E. and John Wilder

APPENDICES TO HANDBOOK OF FABRIC FILTER TECHNOLOGY. VOLUME II. FABRIC FILTER SYSTEMS STUDY. *GCA Crop., Bedford, Mass., Technology Div., National Air Pollution Control Administration Contract CPA-22-69-38, GCA-TR-70-17-G, 100p., Dec. 1970. 231 refs.*

NTIS: PB200 649

An investigation was undertaken to evaluate the status of engineering technology currently available to the researcher, manufacturer, and user of fabric filter systems. Early contributions to filtration theory and the early history of the use of fabrics for dust and fume filtration are tabulated. Principal US manufacturers of fabric filters are listed, as well as estimated 1968 and 1969 fabric filter sales. Fabric filter applications in the non-metallic minerals industry are indicated. Aerosol engineering science and technology are considered, including forces of adhesion, compaction effects, and effects of fabric surface on dust deposition. Specifications are presented for selected filter fabrics. A glossary of fabric technology is included. Costs, operational problems, maintenance, and design considerations are listed.

16470 APTIC NO. 34698

Billings, Charles E. and John Wilder

HANDBOOK OF FABRIC FILTER TECHNOLOGY. VOLUME I. FABRIC FILTER SYSTEMS STUDY. *GCA Corp., Bedford, Mass., Technology Div., National Air Pollution Control Administration Contract CPA-22-69-38, GCA-TR-70-17-G, 610p., Dec. 1970. 366 refs.*

NTIS: PB 200648

An investigation was undertaken to evaluate the status of engineering technology currently available to the researcher, manufacturer, and user of fabric filter systems. Historical aspects, operating principles, and application areas are considered. Descriptive aerosol technology, fabric filtration processes, flow through porous media, and system pressure and flow are discussed. Standard available equipment, filter configurations, cleaning mechanisms, and construction and materials are described. Fabric selection is included. The engineering design of fabric filter systems is discussed, as well as performance, economics, and operation and maintenance.

16471 APTIC NO. 34799

Billings, Charles E. and John Wilder

HANDBOOK OF FABRIC FILTER TECHNOLOGY. VOLUME IV. FABRIC FILTER SYSTEMS STUDY. (FINAL REPORT). *GCA Corp., Bedford, Mass.,* *Technology Div., National Air Pollution Control Administration Contract CPA-22-69-38, GCA-TR-70-17-G, 118p., Dec. 1970. 9 refs.*

NTIS: PB 200651

An investigation was undertaken to evaluate the status of engineering technology currently available to the researcher, manufacturer, and user of fabric filter systems. Current practices in the application of fabric filtration were investigated, as well as major air pollution control areas which could be amenable to control by fabric filtration. Although there are about 50 manufacturers of fabric filter collectors in the United States, nearly 80% of dollar sales are attributable to ten manufacturers. Collector design, fabric design, and system design are discussed, as well as performance analyses. The outlook for new development is considered.

16472 APTIC NO. 34628

Blaser, D. E., J. A. Rionda, and A. L. Saxton

COMBINE DESULFURIZING AND COKING. *Hydrocarbon Process., 50(9):137-141, Sept. 1971.*

Vacuum distillation followed by desulfurization of vacuum gas oils (GOfining), desulfurization of atmospheric residua (RESIDfining), vacuum distillation followed by coking of vacuum residua (Flexicoking), and desulfurization of vacuum and coker gas oils are attractive alternatives for the production of low sulfur fuel oils. A hydroskimming refinery is used as a base case to compare these processing routes and isolate investments and operating costs. With GOfining, feed and gas are preheated in a furnace and flow through a fixed bed catalytic operating at 800 psig or less. Heat is recovered from the reactor effluent in a series of exchangers. Gas and liquid products are separated, and the gases are scrubbed to remove hydrogen sulfide and ammonia. The high pressure gas is combined with makeup hydrogen and recycled to the preheat furnace. The combined liquid bottoms are stripped and/or fractionated to remove dissolved gases and a very small amount of product naphtha from the desulfurized product. RESIDfining incorporates a reactor plugging protection system to compensate for coking and fouling tendencies of more difficult feeds. Its more important advantages are the catalyst and the low pressure of the unit. Flexicoking is a fluid coking process with coke gasification.

16473 APTIC NO. 34620

Bluhm, Hans-Joachim

CONTRIBUTION BY THE TIN CAN MANUFACTURING INDUSTRY TO THE LIMITATION OF EMISSIONS. *(Der Beitrag der Feinstblechpackungsindustrie zur Emissionseingrenzung). Text in German. Staub, Reinhaltung Luft, 31(10):401-406, Oct. 1971.*

During stove lacquering of tinned fine metal sheets (tin plate), emissions in the form of gaseous hydrocarbons develop, which are formed from the solvents contained in the lacquer and are present in a highly diluted state in the waste gas from the lacquer drying ovens. Since very little is known about the biological effect of hydrocarbons, such emissions should be avoided. In Germany, a regulation limits such emissions to 300 mg/cu m waste gas. Los Angeles limits the daily emission from lacquer drying ovens to 15 lbs. The best solution for the reduction of the hydrocarbon emission in these industries would be a coating process which does not require any solvents. Separation of the solvents by cooling or absorption on activated coal proved to be uneconomical because of the small concentrations (1.0 to 10 g/cu m waste air) present in the waste air. Combustion of the solvents in the waste air can be used. This oxidation causes the formation of water and carbon dioxide which are emitted instead of the solvents. If the oxidation is carried out in a flame, the waste air must be heated to temperatures between 700 and 900 C. Because of the high energy costs in Germany, this method is too expensive. Some pilo plants for catalytic combustion of the solvents are in operation in Germany. They are preceded by filtration for removal of catalyst poisons. Final results are not available yet, since the experiments are still in progress.

16474 APTIC NO. 34477

Borio, R. W. and R. P. Hensel

COAL-ASH COMPOSITION AS RELATED TO HIGH-TEMPERATURE FIRESIDE CORROSION AND SULFUR-OXIDES EMISSION CONTROL. *Preprint, American Society of Mechanical Engineers, New York, 7p., 1971. 21 refs. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D. C., Nov. 28-Dec. 2, 1971, Paper 71-WA/CD-4.)*

Utilities experiencing a high-temperature metal wastage problem are provided with a tool, in the form of a nomograph, with which they can objectively evaluate their coals in terms of corrosive potential. The reduction of a coal's corrosive potential either by a benefaction process or the use of additives also can be effectively evaluated with the nomograph. A further advantage is that the nomograph can be used to evaluate coals before the fact, i.e., before they have been burned in the boiler. The nomograph was constructed from tests using bituminous coals; therefore, application to other ranks of coal would be questionnable. Short-term probe tests have provided a direct means of measuring corrosive potential and have resulted in a very good correlation with observed wastage rates in the test furnace. However, this approach is after the fact in that the coals must be burned in a furnace to obtain necessary measurements. Both the nomograph predictions (Corrosion Index) and the short-term probe results (acid soluble sodium monoxide/potassium monoxide) have been correlated to laboratory-observed corrosion rates (mg/sq cm/300 hr). Measured corrosion rates in utility boilers may not match test furnace data. Reduction of sulfur dioxide emissions by limestone and lime was also discussed. (Author summary modified)

16475 APTIC NO. 34332

Bozsin, Michael

STACK EMISSION CONTROL. *IEEE (Inst. Elec. Electron. Engrs.) Trans. Ind. Gen. Appl., 7(5):629-631, Sept./Oct. 1971. (Presented at the Institute of Electrical and Electronics Engineers Industry and General Applications Group Meeting, Annual, Chicago, Ill., Oct. 5-8, 1970. Paper 70 TP 4-IGA.)*

Control of stack emissions from ceramic process equipment such as glass tanks and smelters is discussed. The first step in control is to determine the amount of gases or particulates emitted from all chimneys in the entire process. This is done by weighing collected solid matter and by analyzing the gaseous effluents. If the emission exceed local maximum allowable limits, process changes should be evaluated. Suggested changes include physical elimination of fine particle raw material by purchasing the pelletized form; elimination of burner turbulence by electric melting or use of a recuperator; and simple engineering changes. In one case, lowering the raw material charging screw conveyor to glass-melting level reduced particulate emissions by 80%. If process changes are inadequate, abatement procedures are in order. These include recycling of material to the process, bag collectors, and scrubbers. Proper equipment use depends on proper application of chemical and engineering principles.

16476 APTIC NO. 34381

Brobeck, William M.

STEAM VEHICLE POWER PLANT DESIGN AND DEVELOPMENT. *Preprint, Dept. of Transportation, Washington, D. C., Urban Mass Transportation Administration, 4p., 1971. (Presented at the Steam Bus Symposium, Washington, D. C., Nov. 17, 1971.)*

Specifications are presented for steam-powered buses and trucks, as well as a diagram of a steam power cycle, in relation to vehicle emission standards. The steam-powered units will produce 0.2 g/mile hydrocarbons, 1.0 g/mile carbon monoxide, 0.4 g/mile nitrogen oxides, and no lead emissions, which are well under the 1975 California emissions standards.

16477 APTIC NO. 35030

Buelow, Martin, Andreas Grossmann, and Wolfgang Schirmer

STUDY OF THE PRESSURE DEPENDENCE OF THE SEPARATING FACTOR AT THE ADSORPTION OF BINARY GAS MIXTURES. *(Zur Abhaengigkeit des Adsorptionstrennfaktors binaerer Gasgemische vom Druck). Text in German. Chem. Tech. (Berlin), 23(10):611-612, Oct. 1971. 10 refs.*

Thermodynamic considerations are used for approximation of the pressure dependence of the separating factor at the adsorption of binary gas mixtures. The separating factor is expressed by the equation: ln alpha is approximately proportional to b minus k ln p sigma, where b and k are constants and p sigma is the total pressure. The validity of the equation is demonstrated for the adsorption of binary gas mixtures such as propane-methane, n-butane-methane, ethylene-ethane, and ethane-methane on activated coal. The equation has the disadvantage that the constants b and k are empirical and specific for one system. The experimental determination of the separating factor at two different total pressures is necessary. The extrapolation of alpha-psigma dependence, which is feasible with the above equation, helps to keep the extent of the determinations at a minimum in comparison to the complex experimental set-up required for the study of the adsorption for gas mixtures.

16478 APTIC NO. 34757

Buick, Kurt

CHARACTERISTIC DIFFERENCES BETWEEN TORNADO FLOW DUST COLLECTORS AND CYCLONES. *(Charakteristische Unterschiede zwischen Drehstroemungsentstauber und Zyklon). Text in German. Verfahrenstechnik, 4(11):511-513, Nov. 1970. 7 refs. (Presented at the Gemeinschaftsausschusses Mehrphasenstroemungen of the VTG and the Verein Deutscher Ingenieiure - Fachgruppe Staubtechnik, March 9-10, 1970.)*

The tornado flow dust collector is basically a centrifugal separator but differs from the cyclone in two characteristic features: the axial flow of the raw air, and the use of secondary air to generate or support a twist flow of the gas or air to be purified, and to transport the particles out of the separator. Ambient air, or part of the purified air or gas stream, or a partial stream of the raw air or gas can be used as secondary air. The ratio between secondary air and the total of raw gas plus secondary air can be adjusted within wide limits, and has an influence on the degree of separation and the energy consumption. Test runs were made to compare performances both types; each had a flow rate of 330 cu m/hr and an air entry speed of 12 m/sec. Quartz dust was injected into the raw air at various controlled rates. Results indicate that the energy consumption for the tornado flow collector is up to eight times that of the cyclone. However, it has several advantages over the cyclone: (a) it is capable of eliminating particle sizes down to less than one micron, compared with three microns minimum size with cyclones; (b) it is better suited for handling abrasive powers; (c) it is better suited for separting materials which tend to cling to walls; (d) a cold secondary air stream can be utilized for separating and simultaneously cooling particles contained in a hot gas.

16479 APTIC NO. 34371

Carris, David M.

DUST CONTROL FOR MODERN PREPARATION PLANTS. *Mining Congr. J., 57(11):40-46, Nov. 1971.*

The increased demand for utility coal at an economical price has reduced the need for the costly wet cleaning of fine coal to make the required quality. If the fines are dry screened on raw coal screens, the screens should be completely hooded and have several dust collecting points. Float dust is pulled through the ductwork into a wet collector or, preferably, a baghouse. If coal is cleaned on an air table, the fine particles are pulled into a dry cyclone collector, where the larger particles are removed. The ultra fines are carried over and collected in a baghouse collector. For thermal drying systems, the dust collection system consists of a dry mechanical collector followed by a wet scrubber. Because of their greater dust collecting efficiency, cyclones of two to 18 feet in diameter are replacing 10 inch diameter cyclones. Most recent dryer installations have included a venturi-type scrubber to meet more stringent air pollution codes. Dry dust should not be conveyed directly to the load-out area; rather, it should be stored in a silo until the dust cools and increases in moisture content.

16480 APTIC NO. 34679

Carruthers, J. D.

WEB OFFSET PRESS AIR POLLUTION: HOW SERIOUS IS IT? Inland Printer/Am. Lithogr., 167(1):50-51, April 1971.

Thermal incineration systems are not suitable to pollution control in printing plants. Experiments were conducted using a gas chromatograph with a mass-integral detector to analyze both quantitatively and qualitatively the exhaust from two 38-in. web presses. Two kinds of heat-set ink containing 20-30% solvent were used on two kinds of stock, gloss-coated and matt-coated no. 45 paper. Analysis of the ink solvent showed mainly C11-C12 hydrocarbons. Increasing the amount of flame drying produced substantial changes. First, the high boiling hydrocarbons completely disappeared from the exhaust. Second, a low-boiling fraction of C3 to C9 hydrocarbons appeared. A change in the kind of paper also produced a noticeable change in the effluent. The glossy paper promoted burning and cracking of the solvent on the web. Consequently, fewer high-boiling hydrocarbons were emitted. The opposite effect was observed for the matt-coated paper. These results indicate that by adjustment of heat in the dryer, smoke and odor problems from high-boilers and low-boilers, respectively, can be controlled.

16481 APTIC NO. 34711

Castle, G. S. P. and I. I. Inculet

DIELECTRIC COLLECTION MEDIA IN ELECTROSTATIC PRECIPITATION. *Eng. J. (Montreal), 54(10):35-40, Oct. 1971. 16 refs.*

Use of dielectric media offers excellent opportunities to increase the collection efficiencies in two-stage electrostatic precipitators. The main improvements result from the Coulomb force components and the increased specific surface in the collection region. At the same time, the dielectric media make it possible to utilize several other electrical and mechanical forces that are completely insignificant in the conventional precipitators. The electric charge retention which was found to last for several hours in certain media and to maintain a relatively high efficiency of collection without the external electric field is an advantage that merits further exploration. Finally, the use of the media is not limited to any particular geometry; fibers, rods, plates, and spherical granules may be used in a variety of assemblies or systems of collection, including fluidized beds. (Author conclusions modified)

16482 APTIC NO. 34660

Cohrs, Fred W.

HOW THE NEWER PLANTS HANDLE KILN DUST DISPOSAL. *Rock Prod., 74(11):58-59,80-82, Nov. 1971.*

Wet pumping of dust should aid the cement industry in finding a concrete admixture capable of rendering the alkalis inactive with troublesome aggregates, or of preventing strength depression. Fire hoses are used for pumping, as the dust slurry forms a very hard coating of calcium hydroxide. The hoses are walked daily to break the coating, which is then flushed out with water. The wetting system consists of a 30-inch diameter Vortex mixer, discharging into a 600-gal tank with a 7.5 hp blender. The slurry overflows into two identical sumps, each feeding a four by two-inch Wilfley pump. The slurry then is pumped up to 1000 ft through a three and a half inch fire house. After treatment with stack gas to reduce the alkalinity to a pH of 10.5 or less, the effluent water is discharged. Other methods include collectors, and recycling.

16483 APTIC NO. 34653

Consedine, Robert L.

BIG DUST COLLECTOR IS CONTROLLING EMISSIONS OF PORTABLE MIXER. *Eng. Contract Rec., 84(11):51, Nov. 1971.*

One of the largest mobile dust collection units in the world is being used in Calgary, Canada at the site of a major highway paving job to control the emissions of the largest portable continuous mix asphalt plant presently in operation. The mobile unit was especially designed to meet and exceed all present and future Alberta air codes. The unit is capable of handling dust streams up to 425 F and, according to the manufacturer, has a 99% plus recovery of solids down to one micron in size. To achieve this, the fabric filter elements consist of 1220 eight ft long by four and a half inch diameter bags made of high temperature DuPont Nomex. The bags are self-cleaned automatically by employing the reverse jet principle.

16484 APTIC NO. 34530

Cooperman, P.

A NEW THEORY OF PRECIPITATOR EFFICIENCY. *Atmos. Environ., 5(7):541-551, 1971. 8 refs.*

A new precipitator efficiency formula emphasizes the importance of turbulence in precipitation in a manner lacking the Deutsch formula. Specifically, the new theory explains the divergence between effective migration velocity (emv) and electrostatic migration velocity as the consequence of changes in particle velocity, both in the direction of gas flow and transverse to it, due to turbulence in the first case and the existence of a concentrated layer of particles in the second. For transverse motion, the net velocity of particles toward electrodes is less than the purely electrostatic velocity by a factor (1 f), where f is the ratio of rate of turbulent transport away from the electrodes to electrostatic transport toward them. For longitudinal motion, the mean particle velocity exceeds the mean gas velocity. At low gas velocities, a new factor--the particle diffusion coefficient--enters into the efficiency calculation in such a way that a significant advantage for low-turbulence precipitators is seen.

16485 APTIC NO. 34566

Cotton, D. H., N. J. Friswell, and D. R. Jenkins

THE SUPPRESSION OF SOOT EMISSION FROM FLAMES BY METAL ADDITIVES. *Combustion Flame, 17(1):87-98, Aug. 1971. 18 refs.*

A propane diffusion flame was used to examine the mechanism of soot removal by metallic additives. The efficiencies of soot removal were determined for 40 metals; a semiquantitative mechanism is proposed for the alkaline earth metals. The alkali metals (barium, strontium, and calcium) undergo a homogeneous gas phase reaction with flame gases to produce hydroxyl radicals which rapidly remove soot or soot precursors. The mechanism is supported by measurements of free-radical recombination catalysis by the alkaline earths in premixed hydrogen-oxygen- nitrogen flames. Mechanisms for soot removal by the other metals are discussed. (Author abstract modified)

16486 APTIC NO. 34551

Daermann, Otto, Dirk Springorum, and Jochen Metzing

THE NEW OXYGEN CONVERTER STEEL PLANT OF RHEINSTAHL HUETTENWERKE AG AT HATTINGEN. *(Das neue Blasstahlwerk der Reinstahl Huettenwerke AG in Hattingen). Text in German. Stahl Eisen (Duesseldorf), 91(22):1232-1238, Oct. 28, 1971. 6 refs.*

The new oxygen converter steel plant, which is the successor to a Siemens-Martin steel plant, began operation in October 1970. The design of the waste gas cooling and cleaning system was determined by the special requirements of a single-converter steel plant. For financial reasons, no steam utilization plant has been attached. The cooling tower has the shape of a twenty-cornered column. It is followed by a two-stage mechanical wet collector. The waste gases cooled to temperatures below 1000 C are preliminarily cleaned in the venturi scrubber and then cleaned in a Pease-Anthony scrubber. In a separator, the dust-laden water droplets are separated. The cleaned gas with a dust content of less than 150 mg dust cu/m gas is blown through a stack into the open air. The scrubbing water is cleaned and recirculated to the scrubbers.

16487 APTIC NO. 34534

Davis, John C.

SO2 ABSORBED FROM TAIL GAS WITH SODIUM SULFITE. *Chem. Eng., vol. 78:43-45, Nov. 29, 1971.*

A sodium-based sulfite absorption process for sulfur dioxide is described. To increase the partial pressure of SO2 in the absorbent solution for easier volatilization, the process takes advantage of the lower solubility of sodium sulfite with respect to sodium bisulfite. By employing an evaporator/crystallizer, a steady state of high bisulfite concentration is set up in the regeneration step, thereby cutting energy requirements and providing for a continuous stream of regenerated sulfite for the absorbent solution. Stack SO2 concentrations from a sulfuric acid plant using the process now average between 200-300 ppm vs the previous 4500-6000 ppm. The plant absorber consists of three sieve trays for counter-current absorption that are set above a humidification/prescrubbing section at the bottom of the column. Tail gas is admitted under the lowest tray, accompanied by a water spray from above and below. Regnerated sulfite solution enters above the top tray and undergoes internal circulation at each stage down the column. Bisulfite-rich solution from the bottom of the column is pumped directly to the evaporator/crystallizer. To minimize corrosion, the process uses 316 stainless steel or 304 stainless steel protected by a Bisonite epoxy/phenolic coating.

16488 APTIC NO. 35015

Delannoy, Georges

ACTION OF THE FRENCH MINING INDUSTRY. *(Action des Charbonnages de France). Text in French. Pollut. Atmos. (Paris), 23:22-26, Oct. 1971.*

The French mining industry has participated in the fight against pollution in the mines themselves, in the processing of coal, and in its combustion. The necessary sampling and measuring devices were developed by the Centre d Etudes et Recherches des Charbonnages de France. In the mines, dust formation is controlled by the infusion of water under pressure into coal seams. During mining itself, water is sprinkled under pressure on coal banks that are being mined. Modern continuous methane monitoring equipment with alarm devices is also used. A difficult problem was coke oven pollution control involving dust and a tar aerosol. But the new oven charging techniques used in the Lorraine basin almost completely eliminated emissions. The French mining industry is characterized by a shortage of anthracite which alone burns without emitting coal tar. Therefore, smokeless coal is being produced by distillation or by oxidation on a large scale. The anthracite method alone yields 1,200,000 tons of smokeless coal a year. Smokeless coal has thus replaced the traditional coal briquettes which generated coal tar. Basic research currently being pursued bears on the formation of nitrogen oxides in furnaces, on the optimal physical and chemical conditions in waste incineration, on solids-gas interaction in combustion gases, and on the harmfulness of particulates and gases to human lungs.

16489 APTIC NO. 34420

Dick, M. N.

THE PREDICTION OF VAPOUR OFFTAKE RATES FROM LPG CYLINDERS. *J. Inst. of Fuel, 43(357):407-412, Oct. 1970. 5 refs.*

A mathematical model simulating the behavior of domestic liquid petroleum gas (LPG) cylinders was developed and varified experimentally. The model predicts the composition of the vapor offtake from an LPG cylinder and the liquid remaining, the liquid temperature, and the cylinder pressure at any state in the evaporation. Both the theoretical and experimental work show that preferential distillation of the more volatile hydrocarbons occurs during use of an LPG cylinder. For mixtures of propane and butanes, complete propane depletion may be found, followed by partial isobutane depletion. This means that the LPG remaining in a nearly empty cylinder is substantially pure n-butane, together with any heavy ends that may be present in the LPG. Since indoor performance of cylinders depleted of their volatile components is still satisfactory, there is no reason why commerical butane should not be supplied to the domestic market. There is often little difference in cylinder s useful lifetime (the time for the cylinder pressure first to fall to zero) for continuous or intermittent offtakes. For cases where cylinder pressure is allowed to fall to zero on successive offtake cycles, with reheating to ambient temperature between cycles, the lengths of the cycles become progressively shorter. In many cases, only the first offtake cycle is long enough to be useful. As a result of the accuracy with which the model predicts maximum offtake rates or cylinder lifetimes, it is now possible to vary cylinder compositions to suit particular applications.

16490 APTIC NO. 34772

Drabek, Vaclav

THE LAW FOR PROTECTION OF THE ATMOSPHERE AND THE TASKS OF THE TECHNOLOGY OF AIR PURIFICATION IN CZECHOSLOVAKIA. *(Zakon o ochrane ovzdusi a ukoly ceskoslovenske vzduchotechniky). Text in Czech. Zdravot. Tech. Vzduchotech., 10(4):189-194, 1967.*

In 1967 the National Assembly of the Czechoslovak Republic passed a law for protection of the atmosphere. Statistics show that between 1959 and 1967 the production of goods, including equipment for air purification, rose by 58%. However, the production of air purifying equipment alone in 1967 exceeded that of 1959 by 78%. Electrostatic precipitators, the principal equipment for removal of solid particles from the air, have been steadily improved, as demonstrated by the reduced area of the collecting electrodes, i.e., the reduced ratio between the area of electrodes and quantity of air flowing through per time unit. In the power industry, a combination of electrostatic precipitators and mechanical dust separators has been the most economic arrangement. The use of selenium rectifiers for AC to DC current conversion has greatly reduced requirements for operation and maintenance. Floor space requirements are about 18% lower since the height of collecting electrodes was increased to 8m. Other applications for electrostatic precipitators are in metallurgical and smelting plants, dry-process cement plants, and plants producing powered lime in rotary kilns. Of the dry mechanical separators the cyclone is most prominent, although its period of service is reduced when it is used for separation of abrasive particles. Fibrous filters have several useful applications.

16491 APTIC NO. 34581

Dreher, E.

AIR CONDITIONING IMPROVES THE CLIMATE. HEAT RECOVERY AT AIR CONDITIONERS AS MEASURE FOR THE PROTECTION OF THE ENVIRONMENT. *(Klimatechnik verbessert das Klima. Waermerueckgewinnung in der Lueftungs- und Klimatechnik als Beitrag zum Umweltschutz). Text in German. Energie (Munich), 23(10:12-17, Oct. 1971. 7 refs.*

Thermal pollution caused by individual air conditioning systems might be negligible, but the number of such systems is high and they operate for long hours. It is estimated that 249 Gcal/year of heat is emitted into the atmosphere from air conditioners. Various methods for heat recovery are available for ventilation and air conditioning systems. The recuperative recovery systems comprise plate and tube exchangers in which the waste air and the fresh air act directly upon each other. They transfer only the heat to the fresh air and not the moisture. With regenerative systems, a rotating storage mass passes the waste air flow and the fresh air flow in a successive manner. The storage mass takes on the heat in the first air flow and gives it off in the fresh air flow. As long as the dew point of the warmer air flow is not exceeded, the moisture condenses in the one air flow and evaporates entirely or partially in the other. Through heat recovery, thermal pollution of the atmosphere is reduced considerably. Also, pollution of the atmosphere by combustion products (gases and fly ash) is reduced in proportion to the heat recovery.

16492 APTIC NO. 34868

Duncan, Leon and Isaiah Gellman

THE AIR POLLUTION CONTROL PROGRAM OF THE NATIONAL COUNCIL OF THE PAPER INDUSTRY FOR AIR AND STREAM IMPROVEMENT. *Vanderbilt Univ., Nashville, Tenn. Dept of Environmental and Water Resources Engineering, and Tennessee Stream Pollution Control Board, Environ. Water Resources Eng. Conf., 9th, Annu., Nashville, Tenn., 1970, p. 41-44. (June 4-5.)*

During the past 15 years, the National Council of the Paper Industry for Air and Stream Improvement has been actively engaged in a research program aimed toward air quality protection. These efforts encompass such areas as development and application of sampling and analytical techniques, adaptation and evaluation of air pollution control equipment, changes in processes and operations to effect improved atmospheric emission, and applications of new concepts in pulp and paper making operations for more effective emissions control. Currently, the major thrust is in the area of odor control from kraft mill operations.

16493 APTIC NO. 34883

Edwards, Frank R. and Roy J. McIlwee

COMBUSTION TECHNIQUES IN AIR POLLUTION CONTROL. *Ind. Finishing (Indianapolis), 46(1):30-34, Jan. 1970.*

The two methods of combustion used in air pollution control systems are catalytic oxidation and thermal incineration. The principal advantage of catalytic oxidation is fuel saving derived from lower operating temperatures; in addition, the materials of construction do not need to be as heat-resistant as for thermal incineration systems. In a thermal incinerator with a primary and secondary chamber, the process air first receives heat from the burner. As the chamber walls are heated, the air receives energy through radiation, conduction, and further convection. In a catalyst system, the process air also receives its first heat energy from the burner. The air then proceeds to the catalyst. As the catalyst mass is heated, it supplies some energy to the air stream by conduction. Temperature rise and design principles for a catalyst system are reviewed.

16494 APTIC NO. 34843

Elkin, H. F. and R. A. Constable

CONTROL OF AIR POLLUTION IN PETROLEUM REFINERIES. *Preprint, American Inst. of Chemical Engineers, New York and Environmental Protection Agency, Research Triangle Park, N. C., 44p., 1971. 19 refs. (Presented at the Technical Environmental Conference, 1st, San Juan, Puerto Rico, July 15-17, 1971.)*

The cost of air pollution control facilities in a refinery depends on many factors, including the complexity of facilities, types of crude processed, location, and degree of control required. Partial economic return may be realized when pollution control facilities recover such components as hydrocarbons, sulfur, and catalyst. Oil refinery technology is discussed, as well as the source and control of emissions. Control methods are indicated for sulfur compounds, hydrocarbons, waste-gas disposal systems, oil-water effluent systems, cracking catalyst regeneration, pumps, valves and flanges, air-blowing of asphalt, chemical treating processes, boilers and process heaters, vacuum jets, loading facilities, odors, particulates, carbon monoxide, nitrogen oxides, and noises. Future requirements, equipment guarantees, operational problems, latest available technology, and changing regulatory targets are discussed.

16495 APTIC NO. 34368

Ellison, William

CLEANUP OF WET-SCRUBBER EFFLUENT. *Ind. Water Eng., 8(8):16-19, Oct./Nov. 1971.*

Wet scrubbers, particularly venturi scrubbers of advanced design, are being systematically applied to an even greater diversity of difficult gas-cleaning problems in the steel industry, the foundry industry, and the power industry. Recirculation and reuse of scrubbing liquid provides the necessary means of controlling liquid effluent from the scrubbing systems. This feature is basic to many large wet collectors installed in recent years. When the design of a scrubber includes spray nozzles or other components susceptible to fouling by suspended or settleable solids in scrubber inlet water, efficient clarification of the liquid recycle stream may be required. For other types of wet collectors, the system design may provide only for removal of the coarse settleable particles from the recycled liquid via a liquid cyclone separator, small recycle tank, or solids classifier. Direct recycle of scrubber discharge water is possible with venturi scrubbers in some applications. Industries are encouraged to discharge to municipal waste-treatment plants after they have provided suitable clarification and pretreatment of waste to remove materials that may be toxic in biological treatment processes.

16496 APTIC NO. 34349

Emmerling, Wolfram

THERMODYNAMIC STUDIES OF A NEW METHOD FOR THE RECOVERY OF WASTE HEAT AT COMBUSTION ENGINES. *(Thermodynamische Untersuchung eines neuen Verfahrens der Abwaermerueckgewinnung bei Verbrennungskraftmaschinen). Text in German. VDI (Ver. Deut. Ingr.) Z. (Duesseldorf), 113(16):1302, Nov. 1971.*

A comparison of Seiliger processes and normal processes in piston engines shows that through injection of cracking gas with reaction temperature shortly before the top dead center, the efficiency and the medium pressure are increased by 15 to 20% over the normal process (gas injection in the intake pipe). If the temperature of the injection gas is below 400 C, injection with low temperature at the bottom dead center is of greater advantage. An addition in the intake pipe raises the efficiency by about 7% but yields a medium pressure which is lower by 8%. Waste heat recovery reduces the negative influences of a small compaction ratio and a low leak pressure on the efficiency and the medium pressure. Contrary to the normal process, higher degrees of efficiency and of the medium pressure are achieved at lower fuel/air ratios than at large ones. With cracking gas operated gas turbines, a comparison of processes with and without intermediate cooling as well as with and without intermediate heating and processes with and without afterburner with the process of the conventional gas turbine shows that cracking gas turbines achieve higher specific capacities. The combustion is more complete and the waste gases are clean. This will be of great importance in the future, particularly for piston engines.

16497 APTIC NO. 34604

Fink, F.

SMELTING OF DOMESTIC AND INDUSTRIAL REFUSE. *(Muellhuette zur Verarbeitung von Haus-und Industriemuell). Text in German. Brennstoff-Waerme-Kraft, 23(11):457-460, Nov. 1971. (Presented at the VTG-Dechema-Kolloquium Industrierueckstaende, Stuttgart, West Germany, March 2, 1971.)*

In the metallurgical reduction of refuse by burning at high temperature, useful end products are obtained such as ferrous metal and refuse gas. The refuse is charged into an arc furnace. The gas which develops has a temperature of 1500 to 1700 C upon leaving the furnace. It must be cooled and cleaned before it can be mixed with city gas, or used in some other way. Scrubbers are mostly used for cleaning the gas from dust, vapors, and acids. The quantity of dirty gas which accumulates is only one-eighth of that accumulated at the incineration of refuse in conventional incinerators.

16498 APTIC NO. 34544

Fischer, Herbert

CONTROL OF THE HEAT FLUX IN THE CATALYTIC STAGES ATTACHED TO A CLAUS PLANT. *(Steuerung des Waermeflusses in den einer Claus-Anlage nachgeschalteten katalytischen Stufen). Text in German. Chem.-Ing.-Tech., 43(21):1168-1171, 1971. 7 refs.*

Hydrogen sulfide rich waste gases are cleaned in Claus plants where the H2S is converted to sulfur according to the reaction 2H2S plus oxygen yields S2 plus water. The reaction is very exothermal and thus very temperature dependent. The main problem of the method is the control of ghr great reaction heat which must be released from the catalytic stage, should a satisfactory conversion be achieved. A solution to the problem was sought by modifications which lead to four versions of the Claus process. The possibilities of controlling the heat flux with respect to a maximum sulfur output, to operating costs, and to safety were studied on a Claus plant with a sulfur output of 100 tons/day and a capacity for treating 9000 cu m waste gas/hour. The waste gas consisted of 37.6% by vol H2S, 61.8% carbon dioxide, and 0.5% methane. The version which operates on the basic principle of the Claus process, with the sole exception of using an additional heat exchanger, sulfur separator, and condenser, is the most efficient one. The other three versions pose an additional thermal burden to the individual converter stages. If the regulations for maintenance of clean air tolerate the sulfur dioxide emission of the basic process, it would be preferred over all four other versions; if not, the version which is closest to the basic principle should be used, since it guarantees the largest output with the lowest emission of SO2.

16499 APTIC NO. 34337

Franke, W.

ENVIRONMENTAL PROTECTION IN THE TEXTILE INDUSTRY. CLEANING OF WASTE AIR FROM TEXTILE DRYERS. *(Umweltschutz in der Textilausruestung Abluftreinigung von Texiltrocknern). Text in German. Textilveredlung (Basel), 6(11):769, Nov. 1971.*

Dry cloth filters retain the fiber particles in the waste air from textile dryers, but they are soon clogged and cannot be cleaned automatically. The filters must be manually cleaned.

Also, the price is high for such filters, should they operate at temperatures of about 200 C. Moreover, they do not help to solve the smoke problem. Wet dust collectors would retain the fibers as well as the smoke. The water must be cleaned, however, in large basins or through special apparatuses, since the fibers settle very slowly. Because of the low specific weight of the fibers, the cyclone cannot be used either. Electrostatic precipitators are too expensive. The most efficient method of cleaning such waste gases is thermal afterburning. The gases are passed into a combustion chamber with high temperatures. Part of the high combustion temperatures are used in the dryer.

16500 APTIC NO. 35018

Freude, Hermann

THE DECONTAMINATED ENGINE. *(Der entgiftete Motor). Text in German. Kosmos (Stuttgart), 67(5):210-211, 213-215, May 1971.*

If the mixture entering the cylinders of a gasoline engine contains enough air to ensure that each carbon and hydrogen particle can burn completely, the exhaust gas should, theoretically, consist of carbon dioxide, water vapor, and the residual nitrogen from the air intake. However, this ideal condition is not feasible, since the combustion process is composed of a sequence of complicated reactions, where intermediate products of varying stability are formed depending on the gas temperature which changes rapidly during the combustion cycle. While combustion with somewhat less air intake results in maximum fuel efficiency, some of the carbon oxidizes into carbon monoxide only, not into CO2, and not all hydrogen particles are changed into water vapor, but combine to hydrocarbons in the exhaust gases. The prevailing high temperature of 2200 to 2400 degree C in the combustion zone enhances the formation of nitric oxide. The percentage of the pollutants CO and NO in the exhaust gas can be reduced by operating with excess air intake. By using intake mixtures with five percent excess of combustion air, a practical compromise has been established between efficiency of combustion and reduction of the concentration of pollutants in the exhaust. The reason for adding tetraethyl lead to gasoline is to provide a fuel better suited to increased compression ratios, where knocking due to premature ignition occurs which is detrimental to engine life and must be counteracted. The development of gasolines with new compositions, to replace the noxious lead additives, appears to be imperative. To reduce, or ultimately, if possible, eliminate CO, NO, and HC emissions, a number of methods are being actively investigated, including secondary combustion in exhaust manifolds of special design, secondary catalytic combustion, and direction of all exhaust gases from the crankcase back to the engine intake.

16501 APTIC NO. 35036

Fritzsche, Egon

MOST IMPORTANT POINTS OF CONSTRUCTION DEVELOPMENT OF ELECTRIC PRECIPITATORS. *(A villamos porlevalasztok szerkezeti fejlodesenek sulyponti kerdesei). Text in Hungarian. Energia Atomtech. (Budapest), 24(2):72-75, Feb. 1971.*

Electric fly-ash separators are expected to have an increase from 40 to 100 in the number of parallel gas-paths and a maximum height of 20 m instead of the present 10 m. A cooperative effort of basic research, market research, industrial research, design development, and technology is necessary to obtain results. If the structural elements are kept at ambient temperature, 7-20% savings in materials are achieved in exhaust design. Up to 104 parallel paths can be used to form individual cells containing the electric field. A 20% deviation in particle velocity can cause 50% deviation in particle concentration. Careful modeling is necessary to develop guide vane systems. Unexpected corona discharge can be reduced. Optimum efficiency of knocking devices is a function of the mass of the knocking heads and of the knocking frequency.

16502 APTIC NO. 35032

Fukunaga, Kazuji, Mutsu Katsuo, and Akira Kodera

MANUFACTURING METHOD OF ADSORBENT WITH ACTIVE CARBON ON POROUS MATERIAL. *(Takoshitsu no kizai ni kasseitan o fuchaku saseta kyuchakutai no seizoho). Text in Japanese. (Kurare Co., Ltd., Kurashiki (Japan)) Japan. Pat. Sho 46-21002. 6p., June 14, 1971. (Appl. Aug. 30, 1968, 1 claim).*

A method of creating an adsorbent with a high rate of adsorption and separation is discussed. Carbon particles of smaller than 60 mesh with prores of 10 to 100 A diameter can be attached to basic porous material by an emulsion type adhesive of 0.01 to one micron particle size. The porous material can be cloth, bulky paper, synthetic resin, or any woven material. One important feature is the use of the emulsion type adhesive, which does not clog the pores of active carbon like a liquid type adhesive.

16503 APTIC NO. 34517

Fulford, G. D., M. Moo-Young, and M. Babu

THERMOPHORETIC ACCELERATION OF PARTICLE DEPOSITION FROM LAMINAR AIR STREAMS. *Can. J. Chem. Eng., 49(5):553-556, Oct. 1971. 14 refs.*

The use of thermophoretic forces or temperature gradients is described to accelerate the depostion of particles up to about 30 micrometers in diameter from a horizontal laminar air stream. Thermophoretic theory is reviewed. Initial experiments were carried out with samples of Lycopodium particles to test for the presence of measurable thermal forces. Mean particle size was determined by means of photomicrography and analysis on an image analyzing computer. Subsequent experiments were carried out with more polydispersed samples of spherical glass beads; the mean particle diameter of the glass beads deposited at any given length was obtained by direct measurement with a microscope. Appreciable effects were obtained even with small temperature gradients.

16504 APTIC NO. 34823

Gall, Joseph M. and David A. Olds

VEHICLE MAINTENANCE FOR LOW EMISSIONS – A CUSTOMER EDUCATION PROBLEM. *Preprint, Society of Automotive Engineers, Inc., New York, 6p., 1971. 7 refs. (Presented at the Automotive Engineering Congress, Detroit, Mich., Jan. 11-15, 1971, Paper 710070.)*

An automotive tune-up clinic for the purpose of reducing undesirable exhaust emissions was held March 14, 1970, as part of an environmental teach-in. Results of this event clearly show that improper automotive maintenance can be a major factor in atmospheric pollution. Idle hydrocarbon emissions were reduced by an average of 55% with a tune-up in which the idle mixture ratio and speed were adjusted for minimum carbon monoxide emissions. It is stressed that the individual motorist must begin to develop an attitude of responsibility toward the maintenance of his automobile to ensure low emissions. (Author abstract modified)

16505 APTIC NO. 34599

Gati, Gyula, Leszlo Fay, and Bela Jover

CATALYTIC OXIDATION OVER MIXED CHROMIUM AND MOLYBDENUM OXIDES: MECHANISM OF OXIDATION OF CARBON MONOXIDES. *(Katalytische Oxydation an Chrom-Molybdaen-Mischoxiden: Mechanismus der Oxydation des Kohlenmonoxids). Text in German. Chemiker Ztg. (Heidelberg), 95(21):907-915, 1971. 20 refs.*

The oxidation of carbon monoxide over chromium oxide/molybdenum oxide catalysts of various compositions was studied in relation to the electron theory of catalysis, the correlation between the oxygen-metal bonding energy and catalytic activity, and reaction kinetic methods. The parallel drop of the catalytic activity and the p-type semiconductivity of chromium oxide as an effect of doping with molybdenum oxide shows that the rate determining step for the oxidation is related to electron donation being the means by which carbon monoxide is chemisorbed. However, it can also be concluded from the existence of a correlation between reducibility and catalytic activity of the samples that the base assumption of the theory is fulfilled, i.e., the rate determining step for the oxidation is the cleavage of the oxygen-catalyst bond. A detailed reaction kinetic investigation shows that from the 34 theoretically deduced kinetic equations, all other mechanisms can be rejected, with exception of the mechanisms by which reaction takes place between adsorbed carbon monoxide and adsorbed oxygen and the rate determining step is the surface reaction. (Author abstract modified)

16506 APTIC NO. 34676

Gilbert, Nathan, I. A. Hobbs, and W. D. Sandberg

ABSORPTION OF HYDROGEN FLUORIDE IN A LIMESTONE-PACKED TOWER. *Chem. Eng. Progr., 49(3):120-127, March 1953. 4 refs.*

Data for absorption of hydrogen fluoride from gas streams in a limestone-packed tower are presented to cover the effect on absorption coefficients of the fraction of limestone packing that has reacted with hydrogen fluoride, gas velocity and temperature, size of packing, concentration of hydrogen fluoride, and type of limestone used. The absorption coefficients varied linearly with the 0.8 power of mass velocity, and the logarithms of the absorption coefficients were directly proportional to the absolute temperature of the gas. The effect of particle size and fraction of limestone reacted was correlated graphically using a parameter involving these variables. Absorption coefficients of different limestones were found to vary widely and to be higher for dimensionally unstable (oolitic) varieties. The data and the correlations obtained were used to calculate depths of packing required to absorb a desired fraction of hydrogen fluoride from the gas concomitant with a given calcium fluoride content. (Author abstract modified)

16507 APTIC NO. 34803

Godfrey, T. G., W. S. Ernst, V. J. Tennery, and L. A. Harris

CHARACTERIZATION AND BEHAVIOR OF ALKALIZED ALUMINA DURING THE SULFUR DIOXIDE SORPTION-REGENERATION PROCESS - A SUMMARY REPORT. *Oak Ridge National Lab., Tenn., Metals and Ceramics Div., Atomic Energy Commission Contract W-7405-eng-26, Interagency Agreements AEC-40-180-69 and AFC-40-183-69, ORNL-TM-3210, 44p., Jan. 1971. 9 refs.*

NTIS: ORNL-TM-3210

Studies on alkalized alumina (sodium aluminate) as a sorber of sulfur dioxide showed that, at least through a limited number of cycles under static bed conditions, sulfur dioxide will be sorbed in significant quantities. All evidence suggested that the sorption capacity tended to decrease with cycling, most likely because of sintering of the very porous, active material. The surface area and pore volume decreased markedly with repeated exposure to the regeneration temperature of 1290 F. There was also a shift in the distribution of pore sizes toward fewer, larger pores. No behavior was observed that suggested the crystallographic changes or partial conversions which occur under cycling cause disruption of the structure. Sulfatized particles had significantly higher crushing strengths than either activated or regenerated material. The strong affinity for moisture shown by the materials was probably a very significant factor in the rather high attrition rates observed in some tests. A second factor that no doubt contributed to poor attrition resistance was the presence of gross internal cracks in these sodium aluminate spheres. (Author conclusions modified)

16508 APTIC NO. 34448

Gouse, S. William, Jr.

MOBILE SOURCE AIR POLLUTION - WHO WON THE WAR? Preprint, Operations Research Society of America, Baltimore, Md., and Inst. of Electrical and Electronics Engineers, New York, 49p., 1971. 78 refs. (Presented at the Operations Research Society of America/Institute of Electrical and Electronics Engineers, Joint Meeting, Anaheim, Calif., Oct. 28, 1971.)

The history of mobile source air pollution control is examined, and it is concluded that the presents levels of control of the automobile in the mid-seventies are arbitrary and not in the best interest of the public. Costs will far outweigh the benefits, especially when one considers the health effects of various pollutants and the contributions of the more noxious effluents from stationary and natural sources. Appropriate measures to insure that vehicles in the hands of the owners are maintained in accordance with the manufacturers instructions in order that the initial and operating costs be related to improved air quality have not been taken. Required levels of control are discussed, as well as the relative control of internal combustion engines for various applications. Standards, test procedures, retrofitting, and inspection are also considered. Recommendations are made. (Author abstract modified)

16509 APTIC NO. 34893

Haas, L. A., T. H. McCormick, and S. E. Khalafalla

REMOVING SULFUR DIOXIDE BY CARBON MONOXIDE REDUCTION. *Bureau of Mines, Minneapolis, Minn., Twin Cities Metallurgy Research Center, Rept. Invest. 7483, 18p., March 1971. 15 refs.*

A bifunctional catalyst of pelletized iron-alumina mixtures can bring about the interaction of low concentrations of sulfur dioxide and carbon monoxide at low temperatures, whereas the separate components cannot. The marked synergistic effect of iron-alumina mixtures cannot be explained on the basis of catalytic support of iron by alumina to prevent sintering. Probably, the low-temperature reaction of low concentrations of SO2 and CO occurs on the bifunctional catalyst by a dual-site mechanism. The reaction rate increased with decreasing pellet diameter up to about one mm, where it leveled off. A measurable reaction rate with 41.2% iron in alumina was observed at 350 C, and the rate doubled about every 50 C in the range investigated. The apparent activation energy for the reaction was 18.3 kcal per mole. The initial reaction rate was not influenced by the partial pressure of the sulfur dioxide but increased directly with the CO partial pressure. As the CO concentration increased, the amount of carbon oxysulfide also increased. The maximum quantity of COS was observed at 400 C. Up to 15% carbon dioxide could be tolerated without an appreciable decrease in reaction rate. However, oxygen concentrations greater than 0.5% drastically decreased the reaction rate. (Author summary)

16510 APTIC NO. 34614

Hammons, G. A. and A. Skopp

NOX FORMATION AND CONTROL IN FLUIDIZED BED COAL COMBUSTION PROCESSES. *Preprint, American Society of Mechanical Engineers, New York, 9p., 1971. 5 refs. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D. C., Nov. 28-Dec. 2, 1971, Paper 71-WA/APC-3.)*

An experimental three in diameter, four foot high combustor was used to study operating variables influencing nitrogen oxides emissions from a fluidized-bed combustor. Initial nitric oxide emissions were highest with a lime bed, somewhat lower with an Alundum bed, and lowest with a Drierite (CaSO4) bed. The NO emissions were constant as a function of run length in the Alundum and CaSO4 operations but decreased in runs with the lime bed. Of the two reaction systems believed to be the cause of decreasing NO emissions with the lime bed, one involved NO, sulfur dioxide, and calcium oxide. Fixed-bed reactor studies of the NO-SO2-CaO system revealed an apparent order of about 0.5 and, from 1400-1600 F, a negative temperature dependence indicating that calcium sulfite was a reactant in the system. The studies also revealed the second reaction system – reduction of NO by carbon monoxide over CaSO4 – with an apparent activation energy of six to eight kcal/g mole at 1300-1700 F. When the combustor was modified to permit two-stage operation, there was a maximum reduction in NO emissions from 615 ppm (110% stoichiometric air, no second-stage air) to 220 ppm (43% first stage, 67% second-stage air). These results were obtained with a CaSO4 bed at 1600 F.

16511 APTIC NO. 34580

Heek, Karl Heinrich

COAL GASSIFICATION IN THE U. S. *(Kohlenvergasung in den USA). Text in German. Glueckauf (Essen), 107(23):895-897, Nov. 11, 1971.*

Problems of future energy demands and environmental pollution caused the United States to support the development of new processes for the production of clean fuel gas from the readily available raw material coal. Huge sums of money have gone into the development. Four processes are in the developmental stage. They are the Synthane, the Bi-Gas, the carbon dioxide acceptor, and the Hygas processes. Schematic diagrams of all four processes are given. All include a gas cleaning system. At the hygas process and the synthane process the gas is also subjected to desulfurization.

16512 APTIC NO. 34488

Herrick, Richard L.

SPECIFICATION REQUIREMENTS FOR ELECTROSTATIC PRECIPITATORS. *Combustion, 43(4):20-23, Oct. 1971.*

Specification requirements for electrostatic precipitators are examined with respect to volume and velocity of gas flow, weight of ash/cu ft of flue gas, disposal of collected dust, temperature of flue gas, gas distribution, and ash conductivity. Specifications should clearly outline operating conditions over the expected life of the boiler system. Normal and extremes of gas flow volume, ash content of fuel, operating temperature, and sulfur content should be stated. Gas distribution should be uniform, and disposal of dust should not affect precipitator performance.

16513 APTIC NO. 34557

Herrick, Richard L.

CONSIDERATIONS OF EMISSION CONTROL METHODS AND DEVICES FOR STATIONARY SOURCES. *Preprint, American Society of Mechanical Engineers, New York, 7p., 1971. 16 refs. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D. C., Nov. 28 - Dec. 2, Paper 71-WA/Fu-5.)*

Emission control methods and devices for stationary sources emitting sulfur oxides, particulate matter, and nitrogen oxides are reviewed. The emission of particulate matter, generally associated with coal burning, can be controlled by electrostatic precipitators, centrifugal dust collectors, and scrubbers. Sulfur oxides control includes fuel substitution (low sulfur content coals or natural gas), wet scrubbing with an alkaline earth slurry, calalytic oxidation, and dry adsorption. Nitrogen oxides from gas, oil, and coal fueled sources can be controlled by firing method modifications, two-stage combustion, and adsorption.

16514 APTIC NO. 34603

Herring, William O.

SECONDARY ZINC INDUSTRY EMISSION CONTROL PROGRAM DEFINITION STUDY. PART 1. TECHNICAL STUDY. (FINAL REPORT). *Environmental Protection Agency, Durham, N. C., Air Pollution Control Office, Rept. APTD-0706, 150p., May 1971. 16 refs.*

NTIS: PB 201739

Effluents containing particulate and gaseous emissions are exhausted from certain processes of the secondary zinc industry, and data on those emissions with related emission-control and process data were obtained from a sampling of plants. The principal processes of the industry are sweating and distillation which are applied to the recovery of metallic zinc. Very significant emissions of particulate and gaseous carbonaceous substances, as well as particulate zinc oxide and zinc chloride, may occur during sweat processes when there are substantial amounts of impurities in the scrap. Emissions from distillation processes principally contain zinc oxide, but these emissions may be satisfactorily controlled using bag-houses. Sweat process emissions are alleviated by selection of processes that appear optimum for the type of scrap being processed and by application of established types of gas cleaning equipment. Afterburners may be necessary in some instances. Several emission control concepts were developed, and recommendations are made for further research and development. Furnaces and their emissions are discussed. (Author abstract modified)

16515 APTIC NO. 34563

Hirako, Yoshio and Motoo Ohta

AN EVALUATION OF EFFECT OF INTAKE FUEL ADDITION ON PERFORMANCES WITH VARIOUS PRECHAMBERS ON A DIESEL ENGINE. *Bull. JSME (Japan Soc. Mech. Engrs.), 13(63):1104-1110, Sept. 1970. 3 refs.*

The effects of the intake of additional fuel on the performance of a high-speed diesel engine were investigated by changing the shape of the prechamber. The maximum output of the engine with additional fuel intake rises to almost the same level independent of the shape ot the prechamber. This increase in output is caused by an improvement in overall thermal efficiency owing to rapid combustion in the main chamber, although the aspirated mixture has no effect on the utilization of the oxygen contained in the cylinder. Additional fuel intake also reduces exhaust smoke, which various unburned hydrocarbons can still be detected in abundance. (Author abstract modified)

16516 APTIC NO. 34314

Iijima, Koichiro

HEAVY OIL HYDRODESULFURIZATION CATALYSTS AND THEIR REACTIONS. *(Juyu suisoka datsuryu-ho no shokubai to hanno). Text in Japanese. Preprint, Japan Society of Chemical Engineering, Tokyo, p. 9-18, 1971. 21 refs. (Presented at the Dicussion on Desulfurization Techniques, 4th, Yokkaichi, Japan, Oct. 20, 1971.)*

Difficulties in desulfurization are mainly found in the direct method, due to the difficulty of precipitation of vanadium and nickel between and within the catalyst particles, and the lowering of catalyst activity caused by asphaltene. Thy principles of desulfurization systems are explained with illustrations and operating variables of various types of systems; catalysts are reviewed. In the direct method of desulfurization, using a stabilized bed of cobalt molybdenum alumina (CoMo/Al203), the desulfurization rate drops drastically in the beginning; it continues to drop up to 50 hours, then stabilizes. Higher desulfurization rates are obtained with higher reaction pressures, or using one mm diameter spherical catalyst particles rather than two mm diameter particles, or thicker catalyst layers under a given condition. The ratio of desulfurization in one kind of heavy oil from the Middle East by the direct method showed elimination of 64% of vanadium, 68% of sulfur, 46% of nickel, and 49% asphaltene. The life and catalytic reaction of catalysts depends on types of oil for which they are used; but in general, efficiency can be improved by enlarging average pore sizes, improving the pore diameter distribution in relation to the macropore volumes, and increasing the surface area in relation to the volume of a catalyst.

16517 APTIC NO. 34993

Inagaki, Koshiro

DRY DESULFURIZATION WITH OXIDATION CATALYST. *(Sankashokubaizai shiyoniyoru kanshikihou haiendatsuryu jitsuyo shiken). Text in Japanese. Preprint, (Industrial Public Nuisance Council, Tokyo (Japan), p. 23-34, 1971. (Presented at the Public Nuisance Symposium, 6th, Tokyo, Japan, 1971.)*

The dry catalytic desulfurization of industrial waste gas was studied. A metallic oxidation catalyst was absorbed by an activated carbon carbon granule to effectively remove sulfur dioxide in waste gas. The catalyst was of a spinel structure, corrosion-resistant to acid such as sulfuric acid. Desulfurization capacity of this active carbon was affected neither by temperature of waste gas nor by speed of feeding of the gas. Because it was a dry process, the temperature drop of the treated gas was very little, resulting in effective diffusion of the treated gas. Sulfuric acid formed on the surface of activated carbon granule and was easily removed by washing. The absorbent for sulfur dioxide could be washed during the desulfurization operation once in one or two days. The SO2 absorbent could also remove nitrogen oxides. Both construction cost and operation cost were quite low. Operational results of the equipment were detailed.

16518 APTIC NO. 34629

Jakob, Russ R.

COKE QUALITY AND HOW TO MAKE IT. *Hydrocarbon Process., 50(9):132-136, Sept. 1971. 9 refs.*

By judicious selection of feedstocks and operating conditions, the refiner can upgrade coke quality for more selective coke uses. The main source of coker feedstock is from the bottom of crude oil fractionators of vacuum columns. To a lesser degree, thermal cracking tar and catalytic cracking decanted oil are also charged to cokers. Recently, coal tar pitch has been added to the list of charge stocks to produce a coke exceptionally low in sulfur, ash, and metal contents. To understand the variables that affect the formation of coke structure and properties, the properties of the hydrocarbon constituents that react to form coke must be known. Asphaltenes, resins, and aromatics are mentioned. In the delayed coking process, the feed is heated to 900-950 F over a short time interval, and two different reaction mechanisms may form coke at these time-temperature conditions. In one, the colloidal suspension of the asphaltene and resin compounds is distorted resulting in the precipitation of the compounds to form a highly cross-linked structure of amorphous coke. The compounds are also subjected to a cleavage of the aliphatic groups following a first order reaction. The second reaction mechanism involves the polymerization and condensation of aromatics. Estimating coke yield is indicated. Sponge, honeycomb, and needle coke are described. The outlook for coke and its uses are cited, as well as how to obtain quality coke.

16519 APTIC NO. 34771

Jonakin, J. and J. F. McLaughlin

OPERATING EXPERIENCE WITH THE FIRST FULL-SCALE SYSTEM FOR REMOVAL OF SO2 AND DUST FROM STACK GAS. *Proc. Am. Power Conf., vol. 31:543-552, 1969. 4 refs.*

In a full-scale sulfur dioxide and dust removal system installed at a power plant in St. Louis, Missouri, an alkaline earth additive (limestone or dolomite) is fed into the furnace where it is calcined into more reactive compounds. These combine with all the sulfur trioxide and a portion of the sulfur dioxide as they pass through the furnace convection unit and air heater. The flue gases then pass through the wet scrubber where the major reaction takes place. In the scrubber, the calcined additive that has not yet combined with SO2 in the furnace reacts with the water and remaining SO2 to form sulfates and sulfites of calcium and magnesium, which are precipitated from the wash water and, together with the fly ash, settle in the clarifier for removal to a disposal area. The clean gas passes up through a demister to remove droplets of water and then to a stack-gas reheater, where it is heated to the desired stack gas temperature. Preliminary operating data show an SO2 removal rate of 85% or more with a 3.4% sulfur coal, equivalent to burning a 0.5% sulfur coal. The steam generator can be operated with additive injection into the furnace, and low-temperature surfaces were easily kept clean, indicating significant reduction of SO3 in the flue gas.

16520 APTIC NO. 34570

Kafarov, V. V., V. L. Perov, and G. Sh. Rysin

MATHEMATICAL MODELS OF THE ABSORPTION PROCESS IN PACKED COLUMNS. *J. Appl. Chem. (USSR) (English translation from Russian of: Zh. Prikl. Khim.), 43(2):311-320, Feb. 1970. 13 refs.*

In accordance with the customary approach to mathematical modeling of packed columns for optimization of design and control, mathematical models of the absorption process can be appropriately subdivided into two fundamentally distinct groups: mathematical models with longitudinal mixing disregarded, and mathematical models with longitudinal mixing taken into account. Longitudinal mixing is one of the principal factors determining the static and dynamic properties of packed columns, and the degree of its influence depends on the hydrodynamic conditions in the column. With longitudinal mixing disregarded, equations are presented with lumped parameters, multistage representation of the process, distributed parameters, and over separation stages. With longitudinal mixing taken into account, it is possible to describe the process with the aid of differential equations with second-order partial derivatives (diffusion model), or approximate representation of the continuous process as a multistage one with lumped parameters at each stage (cell model).

16521 APTIC NO. 34385

Kalish, John

EUROPE S LARGEST KRAFT DIGESTER COMES ON STREAM AT BILLERUD. *Pulp Paper Int., 13(11):51-55, Oct. 1971.*

Europe s largest continuous kraft digester -- rated at 940 tons/day -- and a highly advanced evaporation and cross-recovery system highlight the recently completed kraft pulp expansion at the Gruvon mill of Billerud AB in Sweden. About half of the output of the new digester is flash dried market pulp from twin 275-ton/day flash dryers, marking Billerud s entry as a producer of unbleached kraft market pulp. Environmental and emission control at Billerud centers around a very well designed recovery system with several unique features for optimal operation and order reduction. A new technique of splitting the condensates from the black liquor evaporation stages has been employed to isolate contaminated condensates and provide for subsequent destruction of the contaminants. The two present evaporator lines are attached to a 20-ton/hr forced circulation stage for concentration of the thick liquor to 65% solids, considered to facilitate subsequent combustion. Sodium hydroxide is added to the first stage of the stack gas scrubber. The recovery boiler and other details of the recovery system are described. (Author summary modified)

16522 APTIC NO. 34683

Karl, Alfred

A WET GAS PURIFICATION PROCESS. *(Verfahren zur nassen Gasreinigung). Text in German. (Heinrich Koppers G.m.B.H., Essen (West Germany)) Ger. Pat. 737,031. 2p., May 27, 1943. (Appl. March 30, 1940, 1 claim).*

The process removes acid components like carbon dioxide, hydrogen sulfide, hydrocyanic acid, sulfur dioxide from waste gases. The gases are absorbed with aqueous solutions of organic compounds and removed from the washing liquid through distillation. The organic compounds in the washing liquid are derivatives of gamma-piperidon which contain an unchanged amino-and-keto-group like 2,2,6,6-tetramethyl-4-oxo-piperidine. In these compounds, the keto-group is in a para position to the amino-group. These compounds absorb inorganic acid compounds by forming loose bonds with them which are easily broken by reduced pressure, by an increase in temperature, or preferably by both simultaneously. Thus a separation of the absorbed acids is achieved without decomposition or condensation reactions of the gamma-piperidon in a solution which is returned to the process. Distillation is performed in a column at 60-80 C while scrubbing takes place at 20-30 C.

16523 APTIC NO. 35028

Kasaoka, Sigeaki and Eiji Sasaoka

ADSORPTION OF SULFUR DIOXIDE AND ACTIVATED CARBONS AND ZEOLITES. *(Kasseitan oyobi zeoraito ni yoru aryusan gasu no kyuchaku). Text in Japanese. Kogyo Kagaku Zasshi (J. Chem. Soc. Japan), 74(11):2213-2218, Nov. 1971. 8 refs.*

The treatment of polluted gas, with the improvement of activated porous adsorbents and catalysts, was studied with experiments using activated carbons and zeolites for adsorption of sulfur dioxide. Spheres of 3.8 to 4.7 mm diameters and cylinders of 3.0 to 4.3 mm diameters and heights were used, and operating variables were examined at given pressures, temperatures, flow speeds, and the temperature factor dependency (30 120 C), and concentration factor dependency (0.83-8.33 mol% SO2) were compared. Basic analyses of speed and mechanisms were studied on various adsorption models. Zeolite adsorbents had a far greater adsorption capacity than activated carbons for high temperature, low-concentration SO2. While activated carbons adsorbed evenly by the total internal area of porous body, adsorption progressed in zeolite in a shell formation toward the inside of the porous bodies. The relationship between balance adsorption quantity of SO2 and concentration showed the Freundlich type with any material. The concentration index was 0.50 with activated carbons, and 0.07-0.11 with zeolites, when the temperature was 60 C.

16524 APTIC NO. 34710

Kellogg, H. H.

EQUILIBRIA IN THE SYSTEMS C-O-S AND C-O-S-H AS RELATED TO SULFUR RECOVERY FROM SULFUR DIOXIDE. *Met. Trans., 2(8):2161-2169, Aug. 1971. 16 refs.*

Equilibrium phase diagrams for the systems carbon-oxygen-sulfur and carbon-oxygen-sulfur-hydrogen, showing gas composition as a function of temperature for the carbon and sulfur-saturation surfaces, were calculated from thermochemical data on the numerous gas species present. Recently described experimental work was used to obtain consistent thermodynamic behavior for the seven vapor polymers of sulfur. For the system C-O-S-H, only the pseudo-ternary at the constant atom ratio H/C equal to 4.0 is presented. An iterative procedure, adapted for the digital computer, was used to solve the complex equilibria involved. The influence of the equilibrium chemistry on the design of the processes to reduce sulfur dioxide with C, carbon monoxide, and methane is discussed. In all cases, production of sulfur vapor reaches a sharp maximum at the gas composition having the atom radio (H plus C)/O equal to (one plus X)/(two plus X two), where X is the atom ratio H/C in the reducing agent. Reducing agents with lower values of X yield better sulfur recovery because of the smaller residual amount of hydrogen sulfide and SO2 in the reacted gas. (Author abstract).

16525 APTIC NO. 34330

Ketov, A. N., V. V. Pechkovskiy, and V. V. Larikov

ON THE INTERACTION BETWEEN CALCIUM OXIDE AND SULFUR DIOXIDE. *(O vzaimodeystvii okisi kaltsiya s sernistym uglerodom). Text in Russian. Zh. Prikl. Khim., 44(7):1625-1629, 1971. 16 refs.*

The reactions occurring in the dry limestone method of sulfur dioxide removal are discussed. The composition of solid combustion products in systems such as calcium oxide and sulfur dioxide or CaO, S02, and oxygen were determined. The rate of formation of these reaction products are affected by temperature and the very nature of CaO. Experiments were carried out with lime (CaO) obtained by the calcination of limestone. Thermograms and thermodynamics are discussed for the different systems at different temperatures. The affinity for S02 increased from Ca0 (lime) to CaO (chalk) to CaO (chemically pure) in the CaO, S02, and 02 system and from lime to chemically pure CaO to chalk in the CaO, SO2, and O2 system. Maximum yields of calcium sulfate were obtained following thermal CaO treatment at 1000 C. Interaction of Ca0 and S02 was maximum at 1200 C in the CaO and S02 system when pure CaO was used. The presence of oxygen enhanced the rate of sulfatization. A three to four time excess of oxygen with respect to S02 would provide optimal conditions for the decontamination of the bases.

16526 APTIC NO. 34560

Klapatch, R. D. and T. R. Koblish

NITROGEN OXIDE CONTROL WITH WATER INJECTION IN GAS TURBINES. *Preprint, American Society of Mechanical Engineers, New York, 8p., 1971 6 refs. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D. C., Nov. 28 - Dec. 2, 1971, Paper 71-WA/GT-9.)*

A control method for nitrogen oxide emissions form gas turbines is examined. Full-scale tests on an industrial turbine engine fueled by natural gas determined that injecting water directly into the combustion chamber greatly reduced NOx emissions. Similar reductions were achieved when operating on liquid fuels. The injection of water directly into the chamber minimized any deterioration in normal performance or durability. (Author abstract modified) 0

16527 APTIC NO. 34414

Kocho, V. S. and V. K. Kurilov

HEAT EFFICIENCY DUE TO AFTERBURNING OF CUPOLA GASES. *(Teplovaya effektivnost dozhiganiya vagranochnykh gazov). Text in Russian. Liteinoe Proizv., no. 7:42-43, 1971.*

The kinetics of oxidation of carbon monoxide in gas mixtures similar in composition to cupola furnace gases was studied in a laboratory setup with the aim to determine the heat efficiency of CO combustion. The results of the study were verified in the industry. An equation for the dependance of the amount of reacted CO with time was derived (with parameters depending on temperature and original CO content in gas mixture) which agreed well with experimental measurements. The satisfactory validity of the equation enables application of results of study to the entire range of CO concentrations. The efficiency of combustion of CO in cupola gases has to be determined from heat losses in combustion chamber, from the total heat of reaction released in CO oxidation, and from dependance on original CO concentration and temperature in the combustion zone.

16528 APTIC NO. 34590

Kohler, Bertil

TRENDS OF CENTRAL HEATING STATIONS. *(Utvecklingstendenser pa fjarrvarmeomradet). Text in Swedish. Kem. Tidsker., 83(7-8):38-39, 41-42, 1971.*

Central heating stations are being built in increasing number. By applying adequate processes, heat production can be combined with the generation of electric energy at reasonable rates. By using larger units, air pollution can be limited to a low level. The situation in Sweden concerning air pollution is compared to that in other countries on the basis of statistical data. The significance of the ratio of the generated electric energy to the thermal energy produced is emphasized. About 80% of the energy produced in Sweden is based on fossil combustibles at the present time. The advantages in central heating stations from the point of view of the air pollution are emphasized, pointing out that such stations can guarantee easier and more economical air pollution control. Air pollution in densely populated areas is a fundamental argument for large central heating units. Intensifying co-operation of communities and nearby plants is another important factor in controlling air pollution. Heating by nuclear power plants will be realistic in the decades to come, at first, however, it will be used for the largest cities and densely populated areas only.

16529 APTIC NO. 34313

Komissarov, O. G., G. M. Gordon, V. I. Vasilyev, and G. S. Rozhayskiy

A STUDY ON THE LAWS OF DUST SEDIMENTATION IN HOSE FILTERS WITH STREAM-LIKE BLOW THROUGH. *(Issledovaniye zakonomernostey osazhdeniya pyli y rukavnom filtre so struynoy produvkoy). Text in Russian. Tsvetn. Metal., no. 7:23-27, 1971. 5 refs.*

A radioisotope method based on the measurement of decreasing beta radiation intensity when passed through a layer of dust was used to study the dust distribution along the hose filter surface. The filtrating surface of the filter bag was 1.5 sq m. Air samples were dusted with finely dispersed quartz or lead. The initial dust concentration ranged between 200 and 600 mg/cu m. An artificial radioactive isotope consisting of Strontium 90 and Ittrium 90 was the source for beta radiation. The prophilogram reflecting dust accumulation along the filter bag was recorded according to the oscillations in beta radiation intensity, and then it was graphically represented. The upper portion of the filter hose (at the inlet of the dusty air) showed the highest degree of dust accumulation during the filtering process. The dust distribution along the filter hose surface elicited an exponential rather than a linear trend. The prophilogram recorded following regeneration of the filtrating fabric could be considered linear. Thy irregular dust distribution along the filter hose surface should be reflected in the dynamics of the filtering efficiency. This fact will determine the choice of the optimal ratio between the diameter and the length of the filter hose.

16530 APTIC NO. 34519

Konopka, A. P.

SYSTEMS EVALUATION OF REFUSE AS A LOW SULFUR FUEL: PART 3 – AIR POLLUTION ASPECTS. *Preprint, American Society of Mechanical Engineers, New York, 9p., 1971. 22 refs. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D. C., Nov. 28-Dec. 2, 1971, Paper 71-WA/Inc-1.)*

The extent to which municipal solid waste can reduce sulfur dioxide emission was considered when the waste is used as a fuel for power generation. Air pollution control requirements for power boilers firing municipal refuse are discussed. Particulate emissions from refuse firing and combined refuse and fossil-fuel firing are cited, based on a review of both European and domestic experience with refuse firing, straight fossil fuel, and combined firing. For combined firing, an additional air pollution control requirement is sulfur dioxide absorption; two alternative systems are recommended: a high energy scrubber used for particulate collection and an electrostatic precipitator. In either system, particulate control is followed by absorption of SO2 in an alkaline-based absorption tower. (Author abstract modified)

16531 APTIC NO. 34547

Krambrock, W.

CALCULATION OF THE CYCLONE SEPARATOR AND PRACTICAL CONSIDERATIONS FOR ITS LAYOUT – PART II. *(Die Berechnung des Zyklonabscheiders und praktische Gesichtspunkte zur Auslegung – Teil 2 –). Text in German. Aufbereitungs-technik, 12(10):643-649, Oct. 1971. 2 refs.*

Each cyclone is determined by the cyclone height, the ratio between the cyclone radii, and the ratio between circumferential speed and axial speed in the cyclone tube. At a comparison of cyclones with equal outer diameter or equal volume, the one with the least pressure loss is the one which should be preferred. The theories underlying the calculation of cyclones are extremely accurate. However, the calculation of the collection efficiency does not consider the agglomeration of dust particles which occurs at grain sizes below five micron. In this case, the theoretically obtained collection efficiency is much lower than the one achieved in practice. With very hard or elastic particles with grain sizes of more than 100 micron, the actual collection efficiency is lower than the calculated one. With parallel connection of several small cyclones, the total collection efficiency improves over that of a single cyclone. However, if they are connected to one joint dust collection container, the collection efficiency is lower than that of single cyclone. At particle sizes of less than 0.1 micron, it is useless to connect several cyclones of equal size in series; at sizes above 1.0 micron, series connection of several cyclones may be of advantage. With the predominance of particles with sizes above five micron, higher collection efficiencies will be achieved in most cases by series connection rather than parallel connection.

16532 APTIC NO. 34344

Keuhn, Martin

WILL THE COMBUSTION ENGINE DIE BECAUSE OF ITS EXHAUST GASES? A DISCUSSION OF THE EMISSIONS OF AUTOMOBILES. PART II. *(Stirbt der Verbrennungsmotor an seinem Abgas? Zur Dikussion ueber die Emissionen von Kraftfahrzeugen - 2. Teil). Text in German. VDI (Ver. Deut. Ingr.) Nachr. (Berlin), 25(46):6, Nov. 1971.*

One of the more dangerous components of automobile exhaust gases are nitrogen oxides which may be as high as 4000 ppm. For limiting the concentration, combustion cannot take place at high air surplus and at too high a compaction. This is accompanied by formation of a higher carbon monoxide and hydrocarbon concentration. There is strong indication that the inhaled nitrogen oxides react with compounds containing secondary amino-groups present in the body under formation of nitrose amines. The latter are known to have more of a carcinogenic effect than benzo(3-4)pyrene. Intense research is necessary for efficient reduction of all pollutants in the exhaust gas. It would be ideal if nitric oxide and carbon monoxide could be reacted with each other over a suitable catalyst so that the carbon monoxide is oxidized with the oxygen of the nitric oxide to the harmless CO2 and the NO reduced to nitrogen. No experiments in this direction under the conditions of the combustion engine have been conducted. Despite the exhaust gas problem, however, there is no doubt that the combustion engine will continue to exist over the next decades simply because no other drive is available which is so adjustable to the rapidly changing traffic conditions.

16533 APTIC NO. 34611

Kuehn, Martin

WILL THE COMBUSTION ENGINE DIE BECAUSE OF EXHAUST GASES? DISCUSSION0 CONCERNING THE EMISSIONS OF AUTOMOBILES. *(Stirbt der Verbrennungsmotor an seinem Abgas? Zur Diskussion ueber die Emissionen von Kraftfahrzeugen). Text in German. VDI (Ver. Deut. Ingr.) Nachr. (Berlin), 25(45):6-7, 1971.*

There is no doubt that the combustion engine for automobiles will survive over the next decades. Through electronically controlled fuel injection and accurate carburetor adjustment, it has become feasible to fulfill the regulations which have become effective in the Federal Republic of Germany and in the Common Market Countries on October 1, 1971. Afterwards it was not only feasible to reduce the carbon monoxide concentration in exhaust gases to 4.5% but also to comply with the requirements of the California test which sets a limit concentration of 2.5% CO for small and of 1.5% for large engines. The addition of alcohol as an anti-knock agent is frequently overlooked in the discussion of reducing the lead content of fuels. The facilities for the large-scale production of alcohols are not presently available in any of the Western Countries. But the process has been developed. It is based on the conversion of CO with water vapor on iron catalysts. The same measures which are used for reduction of the CO content can be applied to reduction of the carcinogenic components in the oil mists. The task of limiting the formation of oil mists still remains. Engine lubricants should be selected according to their readiness to decompose by oxidation.

16534 APTIC NO. 34839

Kunina, E. M. and M. I. Kheifets

ON THE PROBLEM OF THE ATOMIZATION OF A LIQUID BY A HIGH-VELOCITY GAS STREAM. *(K voprosu o droblenii zhidkosti skorostnym protokom gaza). Inzh. Fiz. Zh., 19(1):116-119, 1970. 7 refs. Translated from Russian. Scientific Translation Service Inc., Ann Arbor, Mich., 5p., Dec. 1970.*

NTIS: ANL-TRANS-871

The problem of the coalescence of solid particles with liquid drops is encountered in the design and study of apparatus for removing dust from gas streams (such as venturi tubes). Its solution requires a knowledge of the character of the distribution function of the drops formed as a result of atomization of a liquid by a high-velocity gas stream. The distribution function has a sharply defined maximum that is represented by the most probable diameter of the drop. The currently used Sauter diameter is not a function assuming a maximum value, but rather the distribution function of drops by size. Formulae for deriving the most probable drop radius are given.

16535 APTIC NO. 34478

Kurylko, Lubomyr

CONTROL OF NITRIC OXIDE EMISSIONS FROM FURNACES BY EXTERNAL RECIRCULATION OF COMBUSTION PRODUCTS. *Preprint, American Society of Mechanical Engineers, New York, 7p., 1971. 19 refs. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D. C., Nov. 28-Dec. 2, 1971, Paper 71-WA/PID-6.)*

An analytical and experimental investigation is described of the control of nitric oxide emission in an external flue gas recirculating furnace. Significant reductions can readily be achieved in emission levels of NO in small, high heat-release, fuel oil-fired furnaces. Reductions were also observed in emission levels of particulates and in combustion noise level. Theoretically, an envelope of maximum possible levels of NO emission was predicted for furnace operations at various excess air firing conditions, and reductions in NO emission due to external recirculation of combustion products were calculated. Gas concentration was measured continuously inside the experimental furnace and in the stack gas, while particulate content of the stack gas also was monitored continuously. Temperature measurements inside the combustion chamber revealed significant differences in the combustion zone structure for recirculating and nonrecirculating modes of furnace operation. (Author abstract modified)

16536 APTIC NO. 34632

Lackner, Richard J.

CLOSED-LOOP PICKLING SYSTEM IS POLLUTION-FREE AND PAYS FOR ITSELF IN REDUCED OPERATING COSTS. *Wire J., 4(12):43-47, Dec. 1971. (Presented at the Wire Association, Annual Meeting, Cleveland, Ohio, Oct. 19, 1971.)*

The major pollution problems associated with pickling, the removal of scale during the production and finishing of steel, arise from the spent pickle liquor which may contain large amounts of sulfuric acid; the rinse water; and the acid vapor. The closed-loop pickling system for control of pollution during the process is examined. Fumes and vapors are controlled by a synthetic fiber filter box which collects the airborne acid and returns it to the pickle tank; there is no visible water vapor effluent plume from the system. The acid recovery plant allows the acid to be maintained consistently at its most effective strength without the possibility of waste, thus compensating for higher iron sulfate strengths and lower pickling temperatures. All of the recovered acid solution is reused in the process. The three-stage rinse system is described.

16537 APTIC NO. 34821

Lee, Charles W., Ronald W. Fuest, and Merlin P. Harvey

REMOVAL OF SO2 FROM FLUE GAS MIXTURES WITH FIBERS CONTAINING POLYMERIC AMINES. *Preprint, American Chemical Society, Washington, D. C., Div. of Water, Air and Waste Chemistry, p. 79-84, 1970. (Presented at the American Chemical Society, Division of Water, Air and Waste Chemistry, Chicago, Ill, Sept. 13-18, 1970.)*

In investigating the removal of sulfur dioxide from waste gases with fibers containing polymeric amines, requirements for a satisfactory sorbent for SO2 were established and a styrene-dimethylaminopropyl maleimide copolymer (SDM) was chosen. The behavior of SDM in powder form was examined in detail as a SO2 sorbent. SO2 was essentially desorbed from the materials by flushing with nitrogen at elevated temperatures (95 C). A loss of capacity occurred with succeeding cycles. A nonthermally desorbable (NTD) material was formed and accumulated. Conversely, water vapor in the gas stream increased the SO2 capacity. The mechanism of SO2 sorption on SDM and SDM-polypropylene fibers, the chemistry and mechanism of formation of the NTD material, and its satisfactory removal are discussed. SO2 capacity, determined as a function of temperature and concentration of SO2 in the gas phase, followed the Langmuir adsorption isotherm. The SO2 capacity decreases rapidly with increasing temperature. The sorptions at 95 C and above are essentially dry. SO2 capacity of SDM under dry conditions is considerably less than in the presence of water vapor.

16538 APTIC NO. 34456

Lee, G. K., E. R. Mitchell, F. D. Friedric, and R. G. Draper

FIRESIDE CORROSION AND POLLUTANT EMISSION FROM CRUDE OIL COMBUSTION. *Preprint, American Society of Mechanical Engineers, New York, 5p., 1971. 3 refs. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D. C., Nov. 28-Dec. 2, 1971, Paper 71-WA/CD-2.)*

A pilot-scale research boiler was used to evaluate the corrosion and pollution potential of a western Canadian mixed-blend crude oil from the Interprovincial Pipeline. This crude oil, even when deliberately contaminated with high leves of salt, can be burned successfully with moderately low excess air. In addition, problems associated with low-temperature deposits, low-temperature corrosion, and pollutant emissions were minimal. High-temperature corrosion, due to either oil ash or gas-phase oxidation, can be controlled by proper selection of boiler tube material. Low-temperature pump and screen tests on the as-received crude oil indicated that no pumping or screen-plugging problems should occur at temperatures above the maximum pour point. Flue gases included carbon monoxide, sulfur dioxide, nitric oxide, sulfur trioxide, soot, and particulates. (Author abstract modified)

16539 APTIC NO. 34887

Lee, G. K.

CONTROL OF OIL ASH DEPOSITS AND POLLUTION ABATEMENT BY AN ADDITIVE. *Fuel Soc. J. Univ. of Sheffield, vol. 20:8-17, 1969. 5 refs.*

The formulation and principal properties of a fuel oil additive are described. The effectiveness of the additive in controlling problems that are universal to boilers burning high-vanadium, high-sulfur residual oil is discussed and its physico-chemical interactions with oil ash and combustion products explained. The additive contains finely divided, non-abrasive particles of partially dehydrated hydroxides of magnesium and aluminum suspended and dispersed in a hydrocarbon carrier with a suitable surfactant. Results of additive trials in both operating boilers and combustion research rigs are given. (Author abstract modified)

16540 APTIC NO. 34579

Lemets, T. D. and E. S. Nenno

KINETICS OF SULFUR DIOXIDE ABSORPTION BY AQUEOUS SUSPENSIONS OF MANGANESE DIOXIDE. *J. Appl. Chem. (USSR) (English translation from Russian of: Zh. Prikl. Khim.), 44(2):293-297, Feb. 1971. 14 refs.*

An investigation of the kinetics of sulfur dioxide absorption by aqueous suspensions of manganese dioxide, and of the accumulation of manganese sulfate and dithionate in solution, at 20, 40, 60, and 80 C, showed formation of manganese sulfate to proceed concurrently with formation of manganese dithionate and independently of the latter. Formation of manganese dithionate in this process is a result of a series of consecutive reactions, involving water and an intermediate product in addition to sulfur dioxide and manganese dioxide. The calculated rate constants for formation of the intermediate product and of manganese dithionate are in satisfactory agreement with experimental data. (Author conclusions modified)

16541 APTIC NO. 34421

Litvinenko, M. S.

UKHIN IN THE CHEMICALIZATION OF THE NATIONAL ECONOMY. *Coke Chem. (USSR) (English translation from Russian of: Koks i Khim.), no. 4:34-37, 1970.*

Process developments are enabling Russian coke and chemical plants to supply chemical and other industries with needed raw materials and intermediates. The developments include the long-distance transmission of coke oven gas for ammonia synthesis, the production of phthalic anhydride and pure anthracene, the continuous formaldehyde purification of napthalene, the production of sodium hydrosulfide and ammonium sulfide from hydrogen sulfide gas, the production of mesitylene and m-xylene, the production of pure sodium thiocyanate, and the catalytic refining of benzene for syntheis. Additional products will be made at coke and chemical plants scheduled for construction within the next five years: dark coumarone-indene resins, n-cresol, p-cresol, pitch semicoke, prepared tar, road tar, colloidal sulfur, 2-vinylpyridine, pyrene, acenaphthene, and acenaphthylene. Specific product applications are cited and the need to expand the market for aromatic products of carbonization is noted. Radical improvements in recovery techniques applied to the main chemical products of carbonization are greatly reducing air and water pollution. The improvements involve placing the hydrogen cyanide and sulfide recovery plant first in the gas flow sequence.

16542 APTIC NO. 34735

Litvinov, A. T.

EFFICIENT GAS CLEANING IN EQUIPMENT USING CENTRIFUGAL FORCE FOR SEPARATION OF DUST PARTICLES FROM THE GAS STREAM. *J. Appl. Chem. (USSR) (English translation from Russian of: Zh. Prikl. Khim.), 44(6):1242-1251, June 1971. 19 refs.*

Gas cleaning equipment using centrifugal force for the separation of dust particles from the gas stream was analyzed. Equations were derived for appxoimate calculations of the residence times of particles of specified diameters in the active zone of the apparatus, of the separation path during motion in a specified region, and for calculation of the optimal Do/D ratios in dust collecting equipment for a specified disperse composition of the aerosol. (Author conclusions modified)

16543 APTIC NO. 34626

McMichael, Francis Clay, Edward D. Maruhnich, and William R. Samples

RECYCLE WATER QUALITY FROM A BLAST FURNACE. *J. Water Pollution Control Federation, 43(4):595-603, April 1971. (Presented at the Water Pollution Control Federation, Annual Conference, 43nd, Dallas, Tex., Oct. 5-10, 1969.)*

Suspended particulates emitted by blast furnaces during steel production can be removed by scrubbers. However, wet cleaning of blast furnace gas results in a waste water. Recycle or reuse of clarified gas wash water creates an alternative waste stream of higher concentration in lower volumetric flow than once-through cleaning. Recycle gas cleaning systems can be operated similarly to once-through systems, but the quality of the recycle water must be monitored to maintain calcium carbonate equilibrium. No process recycle operation can be 100% closed. The gas wash water has a finite capacity to transport dissolved and suspended materials as well as heat, and incremental removals must take place in order to maintain a capacity to clean the gas. The dynamics of conservative tracers in recycle water can be easily modeled. Successful predictions of the time response of the cleaning system to changing levels of blowdown or make-up water can be made. Nonconservative tracers such as pH, calcium, and alkalinity can be monitored, but their dynamic behavior is not predictable at present. (Author summary modified)

16544 APTIC NO. 34427

Metzler, A. J. and J. W. Slough

ANTIPOLLUTION SYSTEM TO REMOVE NITROGEN DIOXIDE GAS. *National Aeronautics and Space Administration, Cleveland, Ohio, Lewis Research Center, Tech. Brief 71-10393, 2p., Oct. 1971.*

A combustor test facility utilized an oxidant-rich hydrazine-nitrogen tetroxide rocket as a gas generator to simulate high enthalpy inlet flow conditions to the combustor. Exhaust emissions, which were pumped to the atmosphere through a stack, contained sufficient nitrogen dioxide to form large reddish-brown clouds which dispersed slowly. The problem was solved by a gas-phase reaction system employing anhydrous ammonia for NO2 removal. The system consists of the ammonia injection and mixing section; a reaction section (reactor); and a scrubber section. All three sections are contained within the system ducting. Steam is provided at each injection point to insure the complete vaporization of ammonia. The scrubber section is a high-surface-contact-area water curtain device. Here solid reaction products are washed from the gas stream and excess NH3 absorbed, resulting in a solution capable of removing any unreacted nitrogen dioxide which might have passed the reactor. At least 99% of the NO2 initially present is removed.

16545 APTIC NO. 34670

Meyers, R. A., J. S. Land, and C. A. Flegal

CHEMICAL REMOVAL OF NITROGEN AND ORGANIC SULFUR FROM COAL. (FINAL REPORT). *TRW Systems Groups, Redondo Beach, Calif., Applied Chemistry Dept. and TRW Systems Group, Redondo Beach, Calif., Chemical Engineering Dept., Air Pollution Control Office Contract EHSD 71-7, TRW Rept. 17270-6007-R-00, 54p., May 14, 1971.*

NTIS: PB 204863

A method for the chemical removal of nitrogen and organic sulfur from coal is examined. Solvents for the removal of organic sulfur and nitrogen were screened and the extraction process and extracted coal were characterized in detail. Weak organic acids, e.g., phenol, o-chlorophenol, cresol, and nitrobenzene, and caustic solutions, including aqueous or alcoholic sodium and potassium hydroxide, were effective for the removal or organic sulfur from coals with a total sulfur content of one to five percent and an organic sulfur content of 0.6-2.0%. Weak organic acids and strong aqueous inorganic acids removed nitrogen from coal. Complete experimental results and operating procedures are included.

16546 APTIC NO. 34690

Meyers, S. and E. D. Margolin

METHODS FOR CONTROL OF EFFLUENT FROM FOSSIL-FUEL-BURNING POWER PLANTS. *International Atomic Energy Agency, Vienna (Austria), and Atomic Energy Commission, Washington, D. C., Symp. Environ. Aspects Nucl. Power Stations, New York, 1970, p. 359-368. 14 refs. (Aug. 10-14, Paper 146/22.)*

Control methods for emissions of sulfur oxides, nitrogen oxides, and particulate matter from fossil-fueled power plants are reviewed. Filters, centrifuges, and electrostatic precipitators, chosen with regard to particle size, density, and electrical properties are examined. Controls for sulfur oxides, including dry limestone injection, wet limestone scrubbing, catalytic oxidation, and magnesium oxide scrubbing, are based on the basic chemical and physical characteristics of the pollutant. Desulfurization of fuels prior to combustion is also discussed. Nitrogen oxides emission control lies in the modification of the combustion process.

16547 APTIC NO. 34944

Milliken, Clint L.

COPPER SMELTER DESIGN FOR THE SEVENTIES. *Preprint, Kaiser Engineers, Oakland, Calif., Metallurgical Projects Dept., 6p., 1970 (?). 5 refs.*

The copper smelter will require drastic design changes to meet the stiffening local and national environmental codes with respect to sulfur dioxide emission. The industry has been surveyed to determine an optimum smelter design based on a high concentration of effluents for the economical removal of SO2 from waste gases. As described herein, the optimum concept involves a combination of two modified processes: a variance of the Outokumpu-type flash furnace, followed by a stationary, top-blown converter. Two significant features of this combination are the continuous overflow of slag and the continuous underflow of very high grade matte – essentially white metal. This means that the slag-blowing operation is virtually completed in the flash furnace, permitting the use of a top-blown converter for the copper blow. (Author abstract modified)

16548 APTIC NO. 34928

Mitchell, Robert L., Jr.

CHLORINE EMERGENCY PROCEDURES. *Preprint, American Inst. of Chemical Engineers, New York, 11p., 1971. (Presented at the American Institute of Chemical Engineers, National Meeting, 68th, Houston, Tex., Feb. 28-March 4, 1971, Paper 14c.)*

The commercial use of chlorine compounds is reviewed, and the safe handling of chlorine is considered. Emergency procedures are outlined as they involve transporation by rail, by pipeline, and by barge. Cooperative control projects are mentioned. During 1968 and 1969, there were 57 known incidents involving leaks or potential leaks out of the transport of some 100,000 tank-car loads of chlorine. Programs of the Chlorine Institute pertaining to safety and emergency procedures are cites.

16549 APTIC NO. 34801

Mounce, William and R. S. Rubin

H-OIL DESULFURIZATION OF RESIDUAL OIL. *Preprint, American Inst. of Chemical Engineers, New York, 25p., 1971. 4 refs. (Presented at the American Institute of Chemical Engineers, National Meeting, 68th, Houston, Tex., Feb. 28-March 4, 1971, Paper 20a.)*

The characteristics of residual oil catalytic hydrodesulfurization and the basic design of the ebullated bed reactor used in the H-Oil process were described. The asphaltenes present in the residuum contain the majority of organometallic compounds which are deposited on the catalyst during reaction. This deposition poisons the catalyst. A direct relationship is seen between vanadium and nickel content of the oil and rate of catalyst deactivation. Another factor in catalyst deactivation is the laydown of carbonaceous material on the catalyst. Not only do residuals contain precursors to coke formation, but the reactor temperatures used cause thermal cracking and polymerization reactions. The ebullated bed reactor is a backmixed, isothermal reactor. In commercial units with extrudate and powder catalyst, the difference in temperature between any two points inside the reactor is no more than 5 F. The heat of reaction is used to bring the feed oil and hydrogen up to reactor temperature. Since the catalyst particles are suspended in liquid, they do not tend to adhere to each other and cause blockage of flow. Any solids in the feed pass through and out. Constant catalyst replacement provides the concomitant advantage of feedstock flexibility. The great majority of atmospheric residuals can be desulfurized using the H-Oil process to produce a heavy oil product meeting a 1.0% sulfur specification. The cost per barrel depends on the degree of desulfurization and the properties of the residual oil. Several commercial units for cracking and desulfurizing residual oil are in operation.

16550 APTIC NO. 34574

Muehlen, Nikolaus von und zur

WASTE AIR IN THE AUTOMOBILE INDUSTRY. *(Abluft in der Automobil-Industrie). Text in German. Staub, Reinhaltung Luft, 31(10):411-414, Oct. 1971.*

A regulation has gone into effect in North Rhine Westphalia that limits the emissions from all plants where lacquers, dyes, or synthetics are applied to and dried on metal, paper, textiles, wood, and glass fiber. The carbon content of these waste gases may not exceed 300 mg/cu m waste gas. Before the regulation became effective, intensive experiments for cleaning these waste gases were carried out. Thermal combustion of the waste gases was sufficient if the carbon content was not higher than 500 to 700 mg/cu m. For higher carbon concentrations, a combination of thermal and catalytic afterburning was necessary. The heat developing at the combustion process can be utilized for the drying process. The preheating torch is supplied by 500 cu m fresh air/hr and about 1500 cu m waste air from the lacquer dryer. The solvent fractions contained in the waste air burn at 800 to 1000 C. The efficiency of this thermal combustion is 60 to 70% if the carbon content does not exceed 700 mg/cu m. For an additional catalytic combustion, platinum catalysts are used. The temperature of the waste gases prior to passage of the catalysts is 400 to 410 C, and afterwards it is 450 to 460 C. This temperature difference can be used for continuous determination of the efficiency of the catalyst.

16551 APTIC NO. 34716

Mueller, James H.

COST COMPARISON FOR BURNING FUMES AND ODORS. *Pollut. Eng., 3(6):18-30, Nov./Dec. 1971.*

In purchasing control equipment, the pollution engineer should make an in-depth study of all costs relating to the purchase and operation of the equipment. For all practical purposes, there are only three types of equipment available for installation on a process exhaust which will meet the 1400 F for 0.5 sec requirement for thermally destroying organic fumes and odors. An afterburner with the addition of a heat exchanger, and a thermal regenerative system are described. Nitrogen oxides must also be eliminated. The need to determine fuel use efficiencies is also necessary.

16552 APTIC NO. 34446

Noles, D. R.

ETHYLENE PLANT PRESSURE RELIEVING SYSTEM. *Proc. Am. Petrol. Inst., Div. Refining, vol. 50:1093-1103, 1970. (Presented at the Midyear Meeting, 35th, Houston, Tex., May 13-15, 1970.)*

Advances in process technology, the design of high speed rotating equipment, and the increased demand for high purity ethylene have resulted in the construction of larger and larger capacity single train ethylene plants. These large single train ethylene plants contain an enormous quantity of light hydrocarbons that must be handled safely during startup, normal operating, shutdown, and emergency conditions. The large quantities of various types of hydrocarbons present, coupled with the wide temperature range (1550 to -200 F) of the materials that must be handled during these various conditions, requires a well designed and safe pressure relieving system. The design of the pressure relieving system in Continental Oil Company's Petrochemical Plant in Lake Charles, Louisiana, is described. The disposal of vapors and liquids is discussed, as well as wet and dry flare systems, emergency conditions, relief valve discharge and flare header piping, metallurgy, the flare stack, flare stack location and height, and thermal expansion and contraction. (Author abstract modified)

16553 APTIC NO. 35027

Novotny, Pavel

FLUID-BED COMBUSTION OF HIGH-SULFUR SOLID FUELS. *(Fluidni spalovani tuhych paliv o vysoke merne sirnatosti). Text in Czech. Uhli, 19(7):297-299, 1971. 6 refs.*

The emission of sulfur dioxide resulting from the combustion of sulfur-containing fuels can advantageously be controlled by changing combustion technology so that more favourable conditions are created for the absorption of sulfur oxides by alkaline additives than is the case in conventional power plant furnaces fired by coal dust. Fluidized-bed combustion meets this requirement by turbulent passage of the gas medium through the furnace and by the pulsating character of the gas flow induced by the fluid bed. The coarse granulation of solid fuel residues has a comparatively small surface but it adsorbs about 50% of the additive which adheres firmly to the coarse surface of cinders. The cinders also remain much longer in the furnace than fly ash and the alkaline additive in coal dust firing. The velocity of gases flowing around the more massive particles is also relatively higher than in the case of fine cinders. Another circumstance favorably affecting the high reaction rate between SO2 and calcium oxide is the lower combustion temperature. Two modifications of this technique have been developed, the slagging and the slag-less technique in the fluid bed. The French Ignifluid system uses the first technique and two step combustion. Solid fuels with a high ash content can be used with this combustion technique. Much work still remains to be done on this technique, but in view of the fact that desulfurization of combustion gases has not been solved satisfactorily, this is currently the only practical approach to atmospheric sulfur oxide control.

16554 APTIC NO. 34762

Obr, Josef

REDUCTION OF EMISSIONS FROM THE PRACHOVICE CEMENT WORKS. *(Snizeni exhalaci prachovicke cementarny). Text in Czech. Cement, Vapno, Azbest. Sadra, no. 2:3-5, 1970. 1 ref.*

The principal dust source in the Prachovice, Czechoslovakia, cement and lime works is a battery of three rotary furnaces for wet production, having a daily production of 430 tons. Cyclone dust separators of the van Tongeren type are not adequate since dust separation is only 50-70%. The costs, effectiveness, and limitations of several possible alternatives are considered. A two-stage dust separator which combines the van Tongeren cyclone separator and Amertherm hose filter for high temperatures was chosen. The installation of the Amertherm is diagrammed and filter purification is described. Advantages of the Amertherm are its high effectiveness in dust separation, reliability, easy adaptation for expanded production, and easy replacement of damaged filter hoses. Technical installation is simple. After installation, atmospheric emissions will be 15kg/hour compared with 1700kg/hour at present.

16555 APTIC NO. 34642

Oshitari, Yoshimi

ELECTROSTATIC PRECIPITATOR. *(Denki shujinki). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 46-30154. 4p., Oct. 18, 1971. (Appl. April 24, 1968, 1 claim).*

After 100 to 200 hours of continuous operation, electrodes of an electric precipitator collect a considerable amount of dusts in various parts and lose 10 to 20% efficiency. Instead of using the usual water spray for cleaning the dust off the electrodes, this invention utilizes rubber or plastic brushes. This electrostatic precipitator comprises an ionization section with discharge wires, cylindrical electrodes and a stabilized rubber or plastic brush between them, and a dust coagulation section which consists of a rotating brush between electrodes. When a predetermined amount of pressure loss occurs, the dust collection section rolls out a new filter belt automatically. The brushes scrape dusts into large lumps from each electrode and deposit them on the filter. When collecting dusts, the filter belt is in the way of the flowing air current, filtering through the air, and when not collecting dusts, it is out of the way, in order to avoid the loss of pressure.

16556 APTIC NO. 34931

Phillipson, J. J.

KINETICS OF HYDRODESULPHURISATION OF LIGHT AND MIDDLE DISTILLATES. *Preprint, American Inst. of Chemical Engineers, New York, 72p., 1971. 37 refs. (Presented at the American Institute of Chemical Engineers, National Meeting, 68th, Houston, Tex., Feb. 28-March 4, 1971, Paper 31b.)*

A hydrodesulfurization design method was developed from studies of the kinetics of the hydrodesulfurization of heptane containing specific sulfur compounds, in the presence of cobalt molybdate. The rate of sulfur removal was first order with respect to the sulfur concentration in each case, but the rate of thiophene hydrogenolysis was much lower than the rate of hydrogenolysis of sulfides, mercaptans, or disulfides. There was negligible interaction of the compounds in a mixture, so that the rate of removal of each type of compound can be predicted from the rate constants measured individually, together with the other observed kinetics. (Author abstract modified)

16557 APTIC NO. 34795

Porter, D. H. and J. D. Watts

ECONOMIC ASPECTS OF CONVERTING A CHLOR-ALKALI PLANT FROM MERCURY CELLS TO DIAPHRAGM CELLS. *Preprint, American Inst. of Chemical Engineers, New York, 15p., 1971. (Presented at the American Institute of Chemical Engineers, National Meeting, 68th, Houston, Tex., Feb. 28-March 4, 1971.)*

In 1969 the U. S. electrolytic chlorine-alkali industry purchased over 20,000 flasks of mercury, or over 25% of the total U. S. consumption to become the largest single purchaser. This industry does not consume mercury to form a product. Following the initial charge, for which another several thousand flasks were purchased in 1969, all mercury entering a plant is used to replace losses -- losses to the sewer, losses in sludges, losses in ventilation air, and losses to product in the form of contaminants. In March 1970, the Chlorine Institute formed an ad-hoc committee to concern itself with the subject and set up several task forces to examine the many phases of the problem. Threshold Limit Values, control programs, and estimated costs are considered. Conversion to diaphragm cells is recommended to eliminate possibilities of mercury pollution. Differences are discussed between the mercury cell and diaphragm cell plants. These pertain to the cell house, rectifiers and amperage, chlorine temperatures and cooling equipment, hydrogen temperatures and recovery, the brine system, caustic handling and waste handling or effluent treatment. Costs are considered.

16558 APTIC NO. 34353

Pring, R. T.

REDUCING BAGHOUSE MAINTENANCE BY DESIGN. *Minerals Process., 11(5):8-13, May 1970. (Presented at the Maintenance Symposium, 5th, Chicago, Ill., April 15-16, 1971.)*

Baghouses for cement kiln, rotary kiln, and clinker cooler applications are discussed with reference to design options and their effect on maintenance and operation. The options include suction versus pressure operation; precleaner versus no precleaner; gas-tight housing versus weather-protected housing; open interior versus partitioned compartments; mechanical shaking versus reverse air for bag cleaning; stack versus monovents versus louvres for effluent discharge; and trough versus pyramid hoppers. Careful consideration of these options can materially reduce problems after startup. With respect to suction versus pressure operation, the pressure baghouse offers a wider selection of floor plans, housing materials, and effluent discharges. In certain models secondary air infiltration is provided, greatly improving accessibility for maintenance and eliminating dead air pockets. Economics favor corrugated metal or corrugated asbestos housings for pressure baghouses. Wet process kilns require a gas-tight insulated construction. The life of a glass bag in kiln service is extended by backflush cleaning of bags with sewn-on anticollapse rings. Methods of transporting dusts from baghouse hoppers are also evaluated.

16559 APTIC NO. 34466

Reh L., J. Ernst, H. W. Schmidt, and K. H. Rosenthal

EXPERIENCES AT THE CALCINATION OF ALUMINUM HYDROXIDE IN A CIRCULATING FLUIDIZED BED. *(Erfahrungen bei der kalzination von Aluminium-hydroxid in einer zirkulierenden Wirbelschicht). Text in German. Aluminium, 47(11):681-685, Nov. 1971. 13 refs. (Presented at the American Institute of Mining., Metallurgical, and Petroleum Engineers, Metallurgical Society Meeting, New York, March 1971.)*

A new fluidized bed calcination method for aluminum hydroxide was developed wherein the fluidized bed furnace is heated by direct injection of heavy fuel oil. At an oxygen concentration of less than 0.5% and a carbon monoxide content of less than 1% in the waste gas, a near stoichiometric combustion without soot development of the fuel oil in the expanded fluidized bed is achieved. The waste gas is cleaned in an electrostatic precipitator mainly from hydroxide particles. After cleaning, the waste gas has a fine dust concentration of less than 90 mg/ cu m. The 53,000 cu m waste gas per hour which contains 40% by volume of water vapor is blown into the atmosphere through a double-walled 70 m high stack. The fluidized bed calcination process comprises three main stages, a two stage venturi fluidized bed preheater, a high temperature calcination stage with highly expanded circulating fluidized bed, and a five-stage fluidized bed cooler for heat recovery from the calcinated aluminum oxide.

16560 APTIC NO. 35035

Richter, Ulf

NEWER ACKNOWLEDGES ON APPLICATION OF ELECTROFILTERS TO PRECIPITATE THE MIXTURE OF PB-ZN-SN OXIDES AT THE EXAMPLE OF A HUNGARIAN FOUNDRY. *(Ujabb ismeretek az olom-, horgany- es onoxidok levalasztasara szolgalo villamos szurok alkalmazasarol az egyik magyar kohomuben). Text in Hungarian. Energia Atomtech. (Budapest), 23(5):228-229, May 1970.*

The flue gases from converters used in scrap copper and copper vitriol works usually need two precipitators: a bag filter and electric precipitator. In Hungary, the precipitation of lead, zinc, and tin oxide particulates exiting from the copper converter is accomplished by an electric precipitator. The electric resistance of these particles is so high between 30 and 350 C that the back-corona effect reduces the precipitation efficiency to 35-75%, which is too low. Efficiencies of 99% can be obtained below 100 C or above 280 C gas temperatures (maximum oxide resistance at 120 C). By adding steam to the flue gas, the dew point can be raised to 65 C. In the present application, 300 C gas was used. Three arrangements are discussed.

16561 APTIC NO. 34426

Roberson, James E.

PLANNING FOR AIR POLLUTION CONTROL. *Ind. Waste, p. 8, 26, 30-33, Sept./Oct. 1971.*

Three factors are essential in the selection of air pollution control equipment meeting control authority regulations: sufficient time must be allowed for the study of the regulations; the sampling procedure must be accurately specified; and control equipment must be specified according to designer estimates for parameters such as gas flow rates, temperature, composition, density, viscosity, particulate concentration, size distribution, composition, shape, and density. It is also advisable to specify control methods for both guaranteed performance and flexibility in design and operation to satisfy future process changes. Examples of variations that can be specified are given for electrostatic precipitators, scrubbers, and mechanical collectors. Cost charts are presented for estimating capital costs of equipment.

16562 APTIC NO. 34536

Roth, James F.

COPPER-BASED AUTO EXHAUST OXIDATION CATALYSTS. DEACTIVATION AND PHYSICAL ATTRITION. *Ind. Eng. Chem. Prod. Res. Develop., 10(4):381-385, Dec. 1971. 11 refs. (Presented at the American Chemical Society, 161st Meeting, Los Angeles, Calif., April 1971.)*

Adverse aging effects, such as deactivation and physical attrition, on copper-based auto exhaust oxidation catalysts were investigated in road and laboratory studies of catalysts comprising copper oxides on alumina. Exposure to cyclic oxidation reduction caused physical attrition of poorly dispersed copper-based catalysts in the presence or absence of halides. This chemically induced attrition process was relatively independent of the hardness of the catalyst support. High dispersion of the copper component imparted good attrition resistance even under cyclic conditions. Halides from the lead motor mix contributed significantly to deactivation via depletion of the active component from the catalyst surface. In the absence of halide, little or no deactivation was observed. Exposure of the copper-based catalysts to excessive temperatures also produced deactivation. (Author abstract modified)

16563 APTIC NO. 34627

Rowland, Clyde H. and Edward A. Grens, II

DESIGN ABSORBERS: USE REAL STAGES. *Hydrocarbon Process., 50(9):201-204, Sept. 1971. 7 refs.*

Real stage calculation techniques which estimate actual tray conditions accurately and with reasonable ease are described for acid gas absorbers. Two general approaches have been applied to the calculation of equilibrium staged separators. In the first, basic equations for such a separator are grouped by stage, and the stages are calculated from one end of a column section to another. In the second general approach, equations are grouped by type, and each type of equation is solved for all stages simultaneously. At the start of each iteration of this stage-to-stage procedure, values of the flow rate, composition, and temperature of the rich solution leaving the absorber must be estimated. The assumed flow rate and composition are corrected by the use of stripping factors. Closure of the overall material balance then permits correction of the estimated temperature of the rich solution by overall column enthalpy balance. A second calculation of the column is then made using corrected values of all assumed rich solution properties. Thiele-Geddes type procedures which involve the grouping of the column equations by type are also described.

16564 APTIC NO. 34429

Russell, James H., Jack I. Paige, and Danton L. Paulson

EVALUATION OF SOME SOLID OXIDES AS SORBENTS OF SULFUR DIOXIDE. *Bureau of Mines, Albany, Ore., Metallurgy Research Center, Rept. of Investigations 7582, 27p., 1971. 6 refs.*

Several solid sorbents were compared for their effectiveness in removing sulfur dioxide from flue gases. The materials were tested for the rate of sorption and capacity at about 300 C, and rate of regeneration around 700 C in thin beds and in 4-inch diameter fluidized beds. Rates of material loss were also estimated. The sorbents tested included three samples of alkalized alumina, two samples of sodium carbonate-impregnated alumina, and one proprietary sample of porous silica impregnated with copper and iron compounds. All the alkalized aluminas had good sorption capacities and rates, required high temperature regeneration, and suffered excessive material loss. The sodium carbonate-impregnated aluminas had high sorption rates but barely adequate capacities, required high temperature regeneration, and suffered excessive material losses. The copper-iron impregnated silica suffered only slight material loss and could be regenerated at a relatively low temperature, but the sorption rate and capacity were too small. (Author abstract modified)

16565 APTIC NO. 34568

Ryabov, V. V.

NEW AIR-FILTRATION MATERIALS FOR ABRASIVE METALLIC DUSTS. *Mach. Tool. (English translation from Russian of: Stanki Instrum., 42(3):60-63, Dec. 1971. 2 refs.*

Materials for removal of abrasive metallic dusts from air were tested for their dust-retention efficiency and aerodynamic resistance in relation to quantity of dust and filtration rate. The effectiveness of shaking in cleaning the materials was also evaluated. Specimens of terylene with nap and nitron fibers had the best filtering properties. Cotton-terylene, cotton-linen, moleskin, and waterproof cape had good dust-retention efficiency, but their aerodynamic resistance was much greater. Glass cloth, filter paper, and capron had low dust-retention efficiency and high aerodynamic resistance. Dust particles retained in the layer of nap on terylene specimens formed an additional filter, which increased the dust-retention efficiency and possessed much lower resistance.

16566 APTIC NO. 34719

Sano, Hiroshi

COMPARISON BETWEEN VARIOUS DESULFURIZATION METHODS -- DESULFURIZATION OF HEAVY OIL AND STACK GAS. *(Datsuryuho no hikakuron -- juyu datsuryu to haien datsuryu). Text in Japanese. Netsu Kanri (Heat Management: Energy and Pollution Control), 23(9):1-9, Sept. 1971. 7 refs.*

The present desulfurization standards, fuel oil supplies, use of liquid natural gas, partially boiled heavy oil, naphtha, kerosene, and light oil as low sulfur containing fuels, various methods of desulfurization, fractionation of heavy oil, detarring process, and the treatment method of condensed high sulfur content oil are discussed. In addition, supplemental methods of pollution control such as high stacks and oil additives are discussed and desulfurization costs are compared. The direct and indirect desulfurizations of heavy oil are the two most frequently used methods of sulfur pollution control. But the general trend is to use more and more of the indirect methods, because of the large quantity of catalytic toxic vanadium which tends to shorten the life of the catalyst required for the direct desulfurization method. The life of a catalyst is less than a year for the direct desulfurization against approximately three years for the indirect method, and consumption of hydrogen is 120 cu m/kl against 60 cu m/kl. The present and the future construction plans for desulfurization facilities are: 7.500,000 kl each for direct desulfurization facilities for 1970 and 1971 and 17.500,000 kl for 1970 and 24,000,000 kl for 1971 for indirect desulfurization facilities. The use of kerosene and light oil costs 60 100% more than the basic cost of heavy oil. Desulfurization of heavy oil costs 30-40% more; desulfurization of stack gas by the dry method costs 25% more and by the lime or alkali method costs 15-20% more.

16567 APTIC NO. 34418

Schaub, Fred S. and Kenneth V. Beightol

NOX EMISSION REDUCTION METHODS FOR LARGE BORE DIESEL AND NATURAL GAS ENGINES. *Preprint, American Society of Mechanical Engineers, New York, 19p., 1971. 3 refs. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D. C., Nov. 28-Dec. 2, 1971, Paper 71-WA/DGP-2.)*

Test results showing the effects of nonstandard operating conditions on nitrogen oxides emissions from large bore, nonvehicular engines are reported. The engines were a diesel/gas-diesel engine and a spark-fired natural gas engine. The nonstandard conditions, all directly or indirectly aimed at modifying combustion cycle temperature-time history, included changes to fuel injection or ignition timing, inlet change temperature, air-fuel ratio, applied brake load, piston speed, and water injection. The effects of these conditions on nitric oxide and nitrogen dioxide reduction were determined individually and in combination. Carbon monoxide, methane, and, in the case of diesel and gas-diesel combustion, total hydrocarbons were also monitored. The test data, in the form of tables and charts, are offered to the industry as introductory information. Solutions to several problems encountered in developing satisfactory analytical techniques are discussed.

16568 APTIC NO. 34582

Schneider, P. and E. Uhlmann

ENVIRONMENTAL PROTECTION IN THE CHEMICAL INDUSTRY (IV): AIR HYGIENE - DEMONSTRATED BY THE EXAMPLE OF EMISSIONS FROM SOLVENT DEPOTS. *(Umweltschutz in der chemischen Industrie (IV): Lufthygiene - am Beispiel der Emissionen aus Loesungsmittel- Tanklagern). Text in German. Chem. Rundschau (Solothurn), 24(46):1185, Nov. 1971.*

A mixture of solvent vapor and air develops in the room above the fluid level of a solvent storage tank which may be emitted into the atmosphere. Through solar radiation as well as through an increase of the ambient temperature, the mixture above the solvent level as well as the solvent are heated, thereby increasing the volume. The excess volume escapes through the ventilation pipe. Solvent vapors are emitted when the tank is filled. Vapor escapes also during removal of the fluid. The tanks should be protected against the influence of heat by isolation, by spraying with cooling water or by covering with a roof against solar radiation to avoid such emissions. These measures do not help to prevent emissions during liquid removal. Thus, the solvent molecules should be separated from the air either by condensation (cold trapping) or by adsorption. Emission losses from such solvent storage tanks may assume considerable proportions (tons per year). The calculation of these emission losses is discussed.

16569 APTIC NO. 35009

Schrader, K.

IMPROVEMENT OF THE EFFICIENCY OF ELECTROSTATIC PRECIPITATION BY INJECTING SO3 INTO THE FLUE GAS. *Combustion, 42(4):22-28, Oct. 1970. 4 refs.*

The accumulated experience pertaining to sulfur trioxide injections into boiler flue gas as a means of increasing electrostatic precipitation efficiency is presented. The addition of gaseous SO3 reduces the very high electrical resistance inherent in many fly ashes due to their chemical composition. With a reduced resistance of the dust adhering to the collecting electrodes, the effective current and the collector efficiency increases. Tests were conducted to determine the reduction in specific dust content as a function of the SO3 injection time, type of coal to be cleaned, and the amount of SO3 utilized.

16570 APTIC NO. 34707

Shipman, R. H.

LPG--SHORT CUT TO CLEAN AIR. *Brit. Clayworker, 79(939):27,31,33-34,36-37, Aug. 1970.*

Liquefied petroleum gas is rapidly gaining prestige in the heavy clay industry as a result of the development activities and firing trials that have been undertaken by the petroleum industry and equipment manufacturers to estabilsh correct techniques, and to prove the advantages of the fuel in kiln firing. Legislation pertaining to smoke and fume control is cited. A series of trials with LPG-firing are described. Firing times and thermal input were reduced below coal firing figures. The erratic temperature profile on coal due to intermittent feeding is clearly seen in comparison with the smooth curve on LPG. Applications to continuous kilns, Shaw kilns, Hoffmann kilns, Staffordshire kilns, car tunnel kilns, and heavy clay drying are indicated.

16571 APTIC NO. 34846

Shroff, G. L. and J. C. Dickson

SCHEDULING AND REBLENDING PROBLEMS OF UNLEADED GASOLINE. *Preprint, American Inst. of Chemical Engineers, New York, 22p., 1971. 1 ref. (Presented at the American Institute of Chemical Engineers, National Meeting, 68th, Houston, Tex., Feb. 28-March 4, 1971, Paper (GH-009.)*

An attempt has been made to evaluate the loss of flexibility which accompanies the restriction of lead additives for octane improvement. Lead is an independent control; without it, octane appreciation in gasoline requires variations in all other components of the blend if volume and other limiting properties are to remain constant. With the possible exception of butane as a control on vapor pressure, no such convenient control exists for other properties of motor gasoline. The costliness of a blend characteristic is measured by multiplying the incremental cost of varying the characteristic.

16572 APTIC NO. 34481

Shultz, Emerson A., Wendell E. Miller, Edward E. Connon, Richard E. Barnard, and W. Rawlin Horlacher

DEVELOPMENT OF A SULFUR CONTROL PROGRAM. *Preprint, American Society of Mechanical Engineers, New York, 7p., 1971. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D. C., Nov. 28-Dec. 2, 1971, Paper 71-WA/Pwr-5.)*

Many systems for removing sulfur from flue gas of electric power generating stations are being developed and a few, such as the Cat-Ox method developed by Monsanto Enviro-Chem Systems, have passed the pilot plant stage and are ready for commercial demonstration. The Cat-Ox system has been demonstrated successfully in two pilot plant installations and is now being installed for the first time on a commercial size unit. System design, flue gas cleaning, flue gas reheating, conversion of sulfur dioxide to sulfur trioxide, heat recovery, sulfuric acid collection, and product storage and leading are described for the application of the Cat-Ox system to the Wood River Plant unit. Instrumentation and monitoring of the process are mentioned. (Author abstract modified)

16573 APTIC NO. 34609

Sinyak, G. S., P. V. Lisovsky, G. I. Chizhikova, M. A. Vitashkina, E. I. Karpova, B. G. Gusarov, and L. L. Zablotsky

CATALYTIC OXIDATION OF GASEOUS PRODUCTS OF PYROLYSIS OF HUMAN WASTES. *(Kataliticheskoye okisleniye nekotorykh gacoobraenykh produktov piroliea otkhodov zhienedeyatel nosti Cheloveka). Text in Russian. Kosmich. Biol. Med., 5(5):77-80, 1971. 5 refs.*

The applicability of catalysts -- hopcalite, copper-chromium, copper-cobalt, platinum and palladium -- to attain deep oxidation of the vapor-gaseous phase formed during the thermal treatment of hum[illegible] wastes was studied. Oxidizing properties of the catalysts were studied on individual gases -- methane, hydrogen, and carbon monoxide. When catalysts with higher activity were used to oxidize an actual gas mixture, the oxidation reaction of the gas mixture was completed at 350 deg only with the palladium catalyst. (Author abstract modified)

16574 APTIC NO. 34672

Slack, A. V.

SO2 RESEARCH YIELDS NEW ALKALI-SCRUBBING TECHNIQUES. *Elec. World, vol. 170:23-26, 48, Dec. 2, 1968.*

Processes investigated by the Tennessee Valley Authority for economic sulfur recovery from power plant stack gases are discussed. Small-scale tests of activated carbons and other adsorbents gave good adsorption and a sulfur dioxide loading up to about 7.5% of the adsorbent weight. SO2 was oxidized and converted to sulfuric acid, but a high recovery cost was indicated to remove the acid out of the carbon pores. Catalytic oxidation, adsorption by alkali compounds, and the use of limestone in dry and wet processes have presented similar cost problems. A process was conceived in which a potassium phosphate solution, developed at TVA for use as a liquid fertilizer, was used as the scrubbing agent in SO2 recovery. In small-scale tests good SO2 removal from the gas was obtained, yet practically all of it precipitated immediately as large, easily separable crystals of pyrosulfite. This is a major advantage, since the pyrosulfite is obtained without cooling and capacity of the solution is not reduced by having to carry dissolved sulfite.

16575 APTIC NO. 34548

Smissen, Carl E. van der

OPERATING TIMES OF FILTER PLANTS. *(Gebrauchszeiten von Filteranlagen). Text in German. Draeger-Hefte, (284):4-15, April-June 1971.*

For determination of the length of time a gas filter or aerosol filter can be satisfactorily used until it has to be cleaned, regenerated, or replaced, the filtering mechanism must be considered. For gas filters based on physical adsorption, the size of the surface of the adsorbent, the pore size, the molecular weight, and the boiling point of the gas which is to be adsorbed are important factors which influence the operating time of such a filter. The temperature also has a decisive influence because it determines the quantity which is adsorbed per time unit. In filters based on chemosorption, the operating time is much less influenced by concentration and temperature of the pollutant-laden gas than it is in the case of adsorption filters. The retention capacity is mainly determined by the activation of the filtering mass. The use of catalysts is terminated when they are loaded with reaction products or when they have been inactivated by poisons. Catalysts are very sensitive to a change of the flow speed. The length of use of a carbon dioxide filter depends largely on the chemical conversion ratio between lime or alkali and CO2, and very little on other factors. The using time of all aerosol filters which cannot be cleaned, is limited by the increase of the flow resistance. The usual method for achieving a long use time for aerosol filters is the combination of a coarse dust filter with a fine dust filter. The use time of electrostatic precipators may be shortened by substances which change the electric charge, such as moisture, mists, or salts. The retention capacity of Draeger gas filters is listed.

16576 APTIC NO. 34520

Sommerlad, R. E., R. W. Bryers, and J. D. Shenker

SYSTEMS EVALUATION OF REFUSE AS A LOW SULFUR FUEL: PART 2 – STEAM GENERATOR ASPECTS. *Preprint, American Society of Mechanical Engineers, New York, 16p., 1971. 24 refs. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D. C., Nov. 28-Dec. 2, 1971, Paper 71-WA/Inc-2.)*

Results are summarized of a study to assess the extent to which municipal refuse, when used as a fuel to generate steam for power generation, can aid in reducing the atmospheric emission of sulfur dioxide. The basic premise is that refuse is a low sulfur, low grade fuel which imposes rather restrictive limitations on steam generator design, but it is shown that it is technically possible to burn refuse in combination with fossil fuels to generate power with substantial benefits to the environment. The basis of the work in this study derives to a large extent from European experience, especially from Germany, that was applied to U. S. conditions in a design study. Design parameters, fuel rate requirements, heat release methods, and refuse firing methods are indicated for the candidate configurations. (Author abstract modified)

16577 APTIC NO. 34740

Sood, Sudesh K. and Richard Karuhn

DEVELOPMENT OF PARTICULATE EMISSIONS CONTROL TECHNIQUES SPARK IGNITION ENGINES. (FINAL REPORT). *IIT Research Inst., Chicago, Ill., Air Pollution Control Agency Contract CPA 22-69-134, APCO Rept. CPA 22-69-134, IITRI Rept. C6186-5, 95p., Feb. 1971. 30 refs.*

NTIS: PB 198033

The experimental results of two techniques for the removal of particulate contaminants from spark ignition engine exahusts were described. The first technique was based on the thermal deposition of lead aerosol particles in the size range 0.1-0.8 micron in a packed bed. The effect of gas-packing temperature differential, packing material, and gas velocity on collection efficiency of the bed was studied. Experimental results show that collection efficiency of the packed bed device depends primarily on the gas-packing temperature differential. At a gas velocity of 15.5 cm/sec, the collection efficiency of the device exceeded 95% at a temperature differential greater than 200 C. Increasing the gas velocity to 130 cm/sec lowered the collection efficiency of the bed by 10-15%. The second technique was based on the use of sonic waves to increase the collisions between the aerosol particles and the relatively coarse particles of a fluidized bed, and hence increase the collection efficiency. The effect of sound frequency, gas velocity, and power input to the sound driver units was studied. Experimental results showed that there was no significant effect of sound frequency, in the range 250-2700 HZ, on collection efficiency of the fluidized bed. Collection efficiency of the fluidized bed increased sharply with power input to the sound driver units when standing sharp waves were used. The use of travelling sound waves did not enhance the collection efficiency of the fluidized bed significantly. (Author abstract modified)

16578 APTIC NO. 34955

Stear, James R.

MINICIPAL INCINERATION: A REVIEW OF LITERATURE. *Air Pollution Control Office, Research Triangle Park, N. C., Office of Technical Information and Publications, Office of Air Programs Pub-AP-79, 187p., June 1971. 486 refs.*

NTIS: PB 200514

Various aspects of the incineration of municipal refuse are reviewed. Such incinerators are large compared to domestic, industrial, and special purpose incinerators. Specific topics covered include refuse quantity and composition; incinerator design and municipal incinerator types; air pollution control equipment; auxiliary equipment; incinerator operation; incinerator emissions; costs; location; evaluation; and incinerator research and pilot projects. A study of incinerators in operation and under construction shows that concern in the United States is mainly for volume reduction. European countries, by contrast, are interested not only in volume reduction but in using refuse as a fuel for steam and power generation. All countries are studying devices for controlling particulate matter from incinerators, such as scrubbers, cyclones, filters, baffles, settling chambers, and process modifications. Electrostatic precipitators, used extensively in Europe, offer one of the better solutions for high efficient emission control. Alternative disposal methods are briefly mentioned, along with advantages and disadvantages of each. A glossary of the most commonly used incinerator terms is included.

16579 APTIC NO. 34351

Stein, Werner A.

CALCULATION OF THE HEAT TRANSFER IN THE SCRUBBER. *(Berechnung des Waermeuebergangs im Spruehturm). Text in German. Chem. Ing. Tech., 43(21):1153-1157, 1971.*

Methods for numerically calculating the free fall of spherical particles in air and for determining cooling and solidifying spherical particles are described. With these methods, the processes in a scrubber which acts as a spray cooler can be calculated. Upon entry into the scrubber at the time t equals O, a spherical particle has the velocity w in the angle phi with respect to the tower axis. With these data, scrubbers with pressure nozzles, rotating spray disks, and rotating spray cages are characterized. With respect to free fall in the tower, the forces of inertia, gravity and friction (air drag) act upon the particle; the buoyancy is negligible. For the air drag, the relative velocity (wr) of the particles as compared to air is of importance. The air velocity is assumed to be constant over the tower cross section. It is positive at parallel flow of particles and air and negative at countercurrent flow. Assuming w, phi, and delta t, the free fall can be pointwise computed. The cooling process is described by the Fourier differential equation. Since no exact solution exists, approximations are used. The calculation is continued step by step until the time for the free fall of the spherical particles and the time for cooling and solidifying agree approximately. Some numerical examples for scrubbers with parallel flow and countercurrent flow and for particles with different heat conductance are given. The results are illustrated in graphs. Particles with a diameter of 2 mm and lower heat conductance can still be treated in countercurrent scrubbers. Larger particles cannot be treated anymore.

16580 APTIC NO. 34767

Stresemann, Ernst

THE LEGISLATIVE SITUATION IN THE FIELD OF AUTOMOBILE EXHAUST GAS DETOXIFICATION. *(Zur Situation der Gesetzgebung auf den Gebiet der Kraftfahrzeug-Abgasentgiftung). Text in German. Bundesgesundheitsblatt, 12(23):384-386, Nov. 21, 1969. 4 refs.*

Legislative measures designed to reduce emission levels produced by automobile exhaust gases are predicated on the availability of a suitable technology. Progress in this field made it possible in 1968 to set maximum emission standards for new automobiles in the U.S., with lower emissions achieved by certain modifications of engine combustion chambers and by installation of oxidative and catalytic afterburners. While these two systems reduce carbon monoxide and hydrocarbon levels in exhaust gases considerably, they do not reduce the level of nitrogen oxides. Because of their known toxicity, maximum standards for nitrogen oxides emitted by new automobiles will go into effect in California between 1971 and 1974, even though at present there is no practicable method to limit such emissions. American experience in this field will be of great importance for other countries and particularly West Germany, where legislation for limiting automobile emissions is long overdue. Advances in detoxifying exhaust gases should not make the task of developing pollution-free automobiles less urgent.

16581 APTIC NO. 34886

Suer, William Monroe Le

DIESEL FUEL. *(Lubrizol Corp., Cleveland, Ohio) Brit. Pat. 1,142,373. 9p., Feb. 5, 1969. (Appl. May 31, 1966, 22 claims).*

A fuel additive for use in diesel engines which produce black exhaust smoke is described. The fuel is burned in the presence of from 1.0 to 2% by weight, based on the weight of the fuel, of a polymeric salt. The metal is a Group I or Group II metal with a particle size of less than 800 microns. The formula of the salt is A-M(O-Y-O-M)sub n-B, where M is a Group I or Group II metal, Y is a carbonyl, sulfinyl or sulfonyl group, n is greater than 1, A is an oleophilic group, and B is an oleophilic group or hydrogen. M may be barium or calcium. The oleophilic group may be derived from a hydrogen sulfonic acid, an aliphatic carboxylic acid, an aliphatic polyamine, or a nitrated olefin polymer. The metal salt and fuel may be separately introduced into the combustion chamber, mixed and introduced together, or the salt may be dispersed in the fuel as it is introduced.

16582 APTIC NO. 35031

Sugishima, Wasaburo and Sumio Okuda

PLASTIC WASTE TREATMENT AND INCINERATION. *(Purasuchikku haikibutsu shori to shokyaku sochi ni tsuite). Text in Japanese. Kankyo Sozo (Environ. Creation), 1(4):57-61, Nov. 1971. 5 refs.*

The problem inherent to the combustion of plastic waste is the exhaust gases which contain toxic elements such as hydrogen chloride, nitrogen oxides, and hydrogen cyanide, carbon monoxide, and soot which contains heavy metals when combustion is incomplete. Carbon monoxide and soot can be eliminated by the use of incinerators with secondary combustion rooms. Hydrogen chloride forms regardless of the degree of combustion; therefore an installation of gas absorption apparatus is necessary. The system can be any of various available types, but generally it should have: a good contact between the absorbent and gas; the smallest possible liquid ratio with the best result; minimum pressure loss and cost for installation and operation; and simple and easy mechanism, operation, and maintenance. One design is a gas adsorption system in which exhaust gas is first sent to a cooling tower where it is cooled and dampened by an alkaline water spray; it is then sent to the absorption tank as it is gradually mixed with alkali. After HCl gas is absorbed in the tank, mists and dusts are separated from the gas by a demister, and the gas is emitted from stacks. The alkaline water used for absorption can be recirculated and only the required amount is supplied automatically. The towers are lined with anti-acid coating against corrosion. For elimination of NOx, adjustment of combustion conditions and chemical treatment of stack gases are applicable, but the latter is more difficult technically. In the former, dropping of the optimum combustion temperature, reducing oxygen or better design of incinerator car decrease NOx considerably.

16583 APTIC NO. 35026

Suzuki, Shigeaki

DIRECT DESULFURIZATION TECHNIQUE AND APPARATUS. *(Juyu datsuryu (chokusetsu datsuryu) gijutsu to sono sochi). Text in Japanese. Kankyo Sozo (Environ. Creation), 1(4):49-55, Nov. 1971. 4 refs.*

The general principle of the direct desulfurization system, material oil for desulfurization, the nature of metal, hydrocarbons, and other elements in the material oil which impair the efficiency of desulfurization, various other operational problems, types of reaction towers, wear and corrosion problems, and economics are discussed. The elements which cause problems of desulfurization are vanadium, nickel, and close to 30 other metals of smaller amount. Ninety per cent of these metal compounds are concentrated in the oil residue to be desulfurized. These metals are extracted by catalysts which cannot be recovered once used. Asphaltene, an aromatic hydrocarbon and insoluble to propane and pentane, contains much more sulfur, nitrogen, and metal compared to solubles and presents a great problem. The amount of sulfur contained in asphaltene is approximately twice as much as the amount in raw oil. Asphaltene is not only difficult to desulfurize, but also impairs the catalytic action of other elements once it is adsorbed by the catalyst. According to the 1970 report of the General Energy Investigation Committee, the average sulfur content in the total fuel consumption in 1974 will be 0.95%, and in 1978, 0.55%. The sulfur content in the oil desulfurized by the indirect method presently under operation is 0.3 0.5%, and that of the oil desulfurized by the direct method is approximately 1.0%.

16584 APTIC NO. 34924

Swithenbank, J.

ECOLOGICAL ASPECTS OF COMBUSTION DEVICES. *Preprint, American Inst. of Chemical Engineers, New York, 30p., 1971. 4 refs. (Presented at the American Institute of Chemical Engineers, National Meeting, 68th, Houston, Tex., Feb. 28-March 4, 1971.)*

The fundamental factors controlling the emission of pollutants by a flare combustion system are: fuel/air ratio controlling smoke and radiation; maximum flame temperature controlling nitric oxide formation; combustion quenching controlling aldehydes; and burner turbulence controlling noise. The parameters which determine the performance of the injector system are area ratio, density ratio, and steam pressure (if used). Fuel type and mixture ratio only affect the burner noise output by about five dB for typical hydrocarbons. The dominant factor is burner turbulence velocity, which can be controlled to decrease the combustion roar by up to 20 dB. Safety and burner cost considerations lead to the current use of simple flare tips. However, the eventual use of more technically sophisticated low pollution units is inevitable. (Author conclusions modified)

16585 APTIC NO. 35033

Tamori, Y., T. Sakabe, and M. Ichikawa

PREVENTION TECHNIQUES OF POLLUTION CONTROLS. *(Kogai boshi gijutsu ni tsuite). Text in Japanese. Netsu Kanri (Heat Management: Energy and Pollution Control), 23(10):48-53, Oct. 1971.*

Various methods of dust collection for combustion gases are reviewed and some aspects of desulfurization are discussed. The combined use of a cyclone and electrostatic precipitator was generally most effective and economical for dust collection when using petroleum as a fuel. The cyclone was used for the elimination of coarse particles in order to reduce the load of dust for the electrostatic precipitator. When heavy oil began to be used more than petroleum, electrostatic precipitators were used for soot coagulation purposes rather than collection, and cyclones placed behind were used to complete the collection of dusts. For dust collection of high temperature exhaust gas, wet scrubbers, especially venturi scrubbers, are widely used as the most reliable and efficient means. Activated manganese dioxide and activated carbon are being used by some industries as an adsorbent of sulfur dioxide in stack gases. Some of other stack gas desulfurization methods include the use of lime or slake lime power in combustion chambers, the use of active sodium carbonate as an adsorbent, or an activated carbon fluidized bed as adsorbent. The addition of sodium carbonate at the rate of 110-120 g/N cu m at 325 C has been proven to be 90% effective for desulfurization. The use of steam as a separater, manufacturing of sodium sulfite in the process of desulfurization, and recovery of sodium sulfite after using it as absorbent, are some of other research projects being carried out by various industries in conjunction with the development of desulfurization techniques.

16586 APTIC NO. 34909

Tanuma, Takeshi, Kenichi Sasaki, Touru Kaneko, and Hajime Kawasaki

IGNITION, COMBUSION, AND EXHAUST EMISSIONS OF LEAN MIXTURES IN AUTOMOTIVE SPARK IGNITION ENGINES. *Preprint, Society of Automotive Engineers, Inc., New York, 16p., 1971. 6 refs. (Presented at the Automotive Engineering Congress, Detroit, Mich., Jan. 11-15, 1971, Paper 710159.)*

The effects of the ignition system, mixture turbulence, and combustion chamber configuration on ignition and combustion of lean mixtures, engine performance, and exhaust emissions were studied on a 4-cycle, water-cooled 4-cyl engine with a 87.2 mm bore, 83 mm stroke, and 1982 cc total displacement. The configuration of the combustion chamber was of the Heron type. The lean limit can be extended by modifications of the gap width, the center electrode diameter, and the gap projection of the spark plug and increase in spark energy. The lean limit is also extended by increasing the mixture turbulence, which becomes more significant with spark advance. A compact combustion chamber is preferable for lean mixture operation. Smooth operation of the engine can be maintained even at retarded spark timing by applying the above-mentioned items and providing hot intake air to the engine. Consequently, exhaust emissions, including hydrocarbons and nitrogen oxides, can be substantially reduced. (Author abstract modified)

16587 APTIC NO. 34328

Tarat, E. Ya., B. I. Roshchin, and Ya. M. Shchelkov

A DUST COLLECTOR WORKING WITH PARTIAL GAS RECYCLING, ASSESSMENT OF ITS EFFICIENCY. *(Otsenka effektivnosti pyleulovitelya, rabotayushchego s chastichnoy retsirkulyatsiyey gaza). Text in Russian. Vodosnabzh. i Sanit. Tekhn., no. 7:22-24, 1971. 9 refs.*

A simplified equation for the assessment of the efficiency of dust collectors with partial recycling is deduced. This equation takes into account the basic physical factors such as the dust concentration of the gas flow and the amount of suction which affect the efficiency of such dust collectors. The efficiency of battery type cyclones with partial recycling flows is increased at any stage of purification of the recycling path within the cyclone. The equation simplifies the processing of experimental data and decreases the amount of measurements involved in the preliminary testing of such dust collectors.

16588 APTIC NO. 34553

Thaxton, Larry A.

HOOD CLOSE TO SOURCE IS KEY CONSIDERATION. *Metal Progr., 100(6):56-58, Dec. 1971.*

Design criteria for exhaust hoods are given. A hood should be placed as close to the source as possible, and hood face velocity and capture velocity must be compatible with one another. The hood should be designed to remove contaminants as fast as they are received under natural conditions, and not as a storage chamber for emissions. In an exhaust system where gas temperature may vary as much as 50 F, an ammeter-controlled damper will provide smooth operation of the exhauster drive motor. In hot-process exhaust systems, laminar-flow conditions should be maintained to provide a boundary layer of cool air against the wall as received from the original source. If the cross-sectional area of a conveying duct exceeds two square feet, the duct should be circular rather than square or rectangular. Use of a baffle plate with canopy hoods is desirable, as the resulting double canopy hood effects a control velocity at greater distance from the hood face with the same volume of exhaust air. On any multisource exhaust system, manual-blast gate dampers should be installed for final balancing of the system.

16589 APTIC NO. 34778

Timby, E. A.

AIRFLOW RATE REQUIREMENTS IN PASSENGER AIRCRAFT. *Royal Aircraft Establishment, Farnsborough (England), Engineering Physics Dept., Ministry of Aviation Supply Current Papers 1136, 27p., 1970. 15 refs.*

NTIS: N71-20849

Airflow requirements for cabins of passenger transport aircraft are considered from the aspects of breathing, temperature control, odor control, pressurization, and equipment cooling. In supersonic aircraft the consequences of a pressurization failure and the requirements of equipment cooling are likely to prevent much reduction in airflow below current figures. The present fresh airflow rate is specified as 1.2 lb/min per passenger during flight and 0.5 lb/min during taxi conditions. In subsonic aircraft the airflow could be reduced for pressurization but is likely to be dictated by odor control on which information is lacking under representative conditions. The minimum engine air bleed rate would occur for a system which recirculates and purifies a proportion of the cabin air. Development of cabin air distribution systems would be required if airflow is to be reduced. Odors can be removed by adsorption, scrubbing, and masking. (Author summary modified)

16590 APTIC NO. 35014

Ulmer, Georges

ACTION OF FURNACE BUILDERS. *(Action des constructeurs d appareils de combustion). Text in French. Pollut. Atmos. (Paris), vol. 13:27-30, Oct. 1971.*

Builders of furnaces have contributed to pollution control by establishing standards for boilers and heaters which guarantee to the user a maximal permissible level of emissions. Since the pollution emission of home heating furnaces is very low, the problem no longer is to lower it further, but rather it is to secure optimal regulation of combustion. The standards were therefore developed not for application to new equipment in the laboratory but to be applied in actual operation. To achieve proper combustion, the air-fuel ratio must remain within rather narrow limits. Excess or deficiency of air causes smoke and unburned substances. Therefore, three separate complementary tests to be performed under different conditions are prescribed for the testing of boiler room furnaces to insure that the furnace can tolerate a degree of irregularity without producing smoke. Due to these measures, pollution caused by home heating furnaces in the Paris region has been cut in half. The claim that a further reduction of pollution can be achieved by the construction of centralized thermal plants is questionable because these operate at higher temperatures and with lower quality fuels.

16591 APTIC NO. 34842

Underhill, Dwight W.

ANALYSIS OF CONCURRENT ADSORPTION AND CHEMICAL REACTION IN PACKED BEDS. *Harvard School of Public Health, Boston, Mass., Atomic Energy Commission Contract AT (30-1) 841, p. 600-606, 1970 (?). 3 refs.*

A set of equations is presented which were derived to facilitate the study of concurrent adsorption and chemical reaction of air pollutants at low concentrations in a packed granular bed (such as a bed of chemically treated charcoal or reactive molecular sieves). Interparticle diffusion, holdup in the interparticle void volume, and an exact equation for intraparticle mass transfer are included in the analysis. The breakthrough curve is analyzed by the method of statistical moments. A useful feature of these equations is that they provide a method for calculating the fraction of adsorbate which will pass through the bed unreacted. (Author abstract modified)

16592 APTIC NO. 34545

Waechter, Karl-August

DRAEGER VENTILATION FILTER. *(Draeger Lueftungsfilter). Text in German. Draeger-Heft, (284):16-23, April-June, 1971. 2 refs.*

Draeger ventilation filters comprise filters for the elimination of small particles and traces of gas and vapor. They are used in air conditioning systems and in ventilators to prevent the emission of toxic substances into the atmosphere. There are five main groups: filters for the separation of aerosols, for the removal of gases and vapors with the exception of carbon monoxide and carbon dioxide, CO filters, CO2 absorption filters, and filters for the removal of gases, vapors, and aerosols. Typical aerosols are smoke, colloidal dusts, and mists. Aerosol filters also retain germs, bacteria, viruses, and pollen. The aerosol filter has a collection efficiency of 99.99% measured with mists of paraffin (particle diameter less than one micron). The filters can operate at temperatures of 150 C, and for short terms, also at 180 C. A high-quality glass fiber filter is used. Gas filters use activated coal which has been prepared for the type of gas to be removed. The filters are designed for six months of continuous operation if one mg pollutant shall be removed from each cu m of air. The CO filter converts the gas into CO2 by means of a catalyst. The reaction must take place at a temperature of 80 C because at lower temperatures the moisture would impair the function of the catalyst. Carbon dioxide is absorbed on lime. The absorber consists of two chambers filled with lime.

16593 APTIC NO. 34423

Wagner, A. J.

ROSS-MEEHAN FOUNDRIES HONORED FOR LEADERSHIP IN AIR POLLUTION CONTROL. *Mod. Casting, 60(5):53-54, Nov. 1971.*

A Chattanooga foundry manufacturing steel castings and iron is now in full compliance with Federal and local pollution-control codes. The foundry recently installed a new baghouse for collecting dust, smoke, and fumes from the two electric arc furnaces in its steel plant and replaced a pair of cupolas with coreless induction furnaces. The baghouse contains 576 orlon bags with a total cloth area of 11,119 sq ft and reduces dust in the air to 0.02 grains/std cu ft. The new melting unit is enclosed in a new building, 65 ft wide by 150 ft long, with 33-ft high craneways. Charges for the new furnaces are preheated to 200 F. Mode of operation is 200 lbs out, 2000 lbs in. Melting throughput is 28 tons in a 14-hr melt day. Monitoring is also discussed.

16594 APTIC NO. 34811

Wickert, Kurt

A PROCESS FOR THE DESULFURIZATION OF COMBUSTION GASES. *(Verfahren sum Entschwefeln von Verbrennungsabgasen). Text in German. (Assignee not given.) Ger. Pat. 1,284,556. 3p., Dec. 5, 1968. (Appl. March 9, 1961, 1 claim).*

The process described desulfurizes combustion gases by adding a mixture of pulverized magnesium oxide and iron oxide (in a ratio of 100:1) to the hot combustion gases at a point in the furnace where a temperature of 850 C prevails. Fe203 acts as a catalyst for the oxidation of SO2 to SO3, MgO as a reaction partner with SO3 yielding magnesium sulfate, which is separated by mechanical or electrical dust arresters. The additives are cheap and the reaction product marketable. The combustion of heating oil with a high sulfur content must proceed with sufficient excess air so that the catalytic oxidation of SO2 to SO3 can take place. MgO must be supplied in an equivalent quantity to the sulfur in the furnace if desulfurization is to be complete. Magnesium sulfate remains in loose powder form even in the presence of steam in the waste gas so that no encrustations occur, even at temperatures below 450 C. The powder mix is injected into the furnace by a blower. At optimal temperatures of 700-750 C, both reactions in the dust cloud are completed quantitatively within one to two seconds.

16595 APTIC NO. 34773

Yamaguchi, Takaaki

HYDROGEN DESULFURIZATION PROCESS FOR HEAVY FUEL OILS. *(Juyu no suisoka datsuryu ni tsuite). Text in Japanese. Gosei Yuki Kagaku (J. Syn. Chem., Japan), 28(1):70-75, Jan. 1970.*

A hydrodesulfurization process, developed for the purpose of changing naphtha quality in the material oil and for refining kerosene is reviewed. The indirect desulfurization method is fairly well developed by now. The principles and mechanism of direct and indirect desulfurization, demetallization, and catalysts used in the process are discussed. Operation strictly for the purpose of desulfurization still presents many problems. The boiling point of heavy oil is 300-600 C as compared to 180-320 C for kerosene. Sulfur content is 1.7-2.9% by weight compared to 0.2-1.0% in kerosene. Heavy oil contains several ten times more ppm of organic metals. The reactive pressure of heavy oil in the system is 80 100 kg/sq cm as compared to 35 55 kg/sq cm for kerosene. The operation ratio of an oil refining plant is generally 90%; usually an inspection and repair period is required once every year or two years, but continuous operation of the desulfurization system is possible for only several months. Various types of troubles, leakages, damages, and their causes are discussed.

16596 APTIC NO. 34800

Yeager, Kurt E. and Lawrence Hoffman

THE PHYSICAL DESULFURIZATION OF COAL - MAJOR CONSIDERATIONS FOR SOX EMISSION CONTROL. *Preprint, Illinois Inst. of Tech., Chicago, Technical Center, 25p., June 1971. 10 refs. (Presented at the American Power Conference, Annual Meeting, 33rd, Chicago, Ill., April 22, 1971.)*

An economic analysis of the major considerations involved in the production and utilization of coal physically desulfurized to a sulfur content of one percent was presented. The current production of Eastern bituminous steam coal estimated as cleanable by physical methods to a one percent sulfur content is 50,000,000 tons or about 12% of the total coal requirements of stationary power sources east of the Mississippi. This application could produce about a six percent reduction in total sulfur oxides emissions in the Easter United States. Analyses of coal source/user combinations in the Eastern United States indicate that generalizations on the new cost of physical coal desulfurization are impractical. The range of combinations studied indicates a net cost change to the coal user ranging from one cent/MBTU saving to a nine cent/MBTU increase. Over 75% of the cases indicate a net cost increase through physical desulfurization of less than five cents/MBTU. The use of physically desulfurized coal appears to be the lowest cost alternative for achieving an emission control level equivalent to one percent sulfur content fuel in Eastern coal-fired stationary power sources having a capacity use factor less than 50 percent. Physical desulfurization, however, may have its greatest application in reducing the sulfur content of high sulfur steam coal. This product would be used in conjunction with flue gas emission control processes to achieve SOx control requirements. The economic benefits occurring from reduced flue gas process capital and operating costs could offset cleaning costs. In addition, stringent SOx emission control regulations combined with the probable SOx removal efficiencies of first-generation flue gas processes may force these high sulfur coal sources to establish practical desulfurization procedures in order to remain in the energy market. (Author conclusions modified)

16597 APTIC NO. 34469

Yoshimura, T.

DUST COLLECTOR. *(Shujinki). Text in Japanese. (Ryosei K. K. (Japan)) Japan. Pat. Sho 46-14959. 4p., April 21, 1971. (Appl. Dec. 31, 1967, 1 claim).*

A modified version of the bag filter is presented for use in a bag filter type dust collector. The conventional bag filter unit, containing several independent tubular bag filters in parallel with space in between, must be made unnecessarily large due to less effective filtering surface area per unit volume. The new bag filter is designed to give more effective filtering area without enlarging the unit. Four filter bag tubes are prepared. A large, long piece of filter cloth is folded in two and sewn down in several lines from the fold to the lower edges of the cloth, creating several filter chambers. The side edges of the folded cloth are sewn together to make the cloth tubular. Three more pieces of filter cloth of varying dimensions are prepared in a similar way. The filter bag tubes are placed concentrically; The lower outer edge of the largest is sewn to a ring-like frame, while the inner lower edge is sewn to the lower edge of the next inner bag filter tube, repeating the procedure for all bags. The filter bag unit is fitted into the filter case of the dust collector. When the air or gas to be filtered is blown into the unit, the compartments expand with the pressure, increasing the effective filtering area and the filtering efficiency.

16598 APTIC NO. 34541

Zenkner, Kurt

CONSIDERATIONS OF THE DESIGN OF THERMAL AFTERBURNING PLANTS. *(Ueberlegungen zur Auslegung Thermischer Nachverbrennungsanlagen). Text in German. Staub, Reinhaltung Luft, 31(10):415-418, Oct. 1971.*

The toxic or odorous components of an industrial waste gas can be eliminated by combustion. An afterburner must provide oxygen, the ignition energy, and sufficient residence time necessary for complete combustion. The most important units of the thermal afterburner are the burners, the combustion chamber, and the heat exchanger. The burners take care of a uniform ignition of all combustible components by supplying auxiliary energy. The position of the flame is determined and maintained by the burner. In the combustion chamber, sufficient residence is provided for complete combustion. It is important that the walls are uniformly heated, and that the temperature distribution in the flame is largely constant. Guide vanes safeguard a flow which always returns to the flame front so that the combustible particles are re-ignited. Combustion tests, with a gas containing 6000 mg combustible matter/cu m waste gas, revealed that the complete combustion of the various components differs widely at chamber temperatures of less than 800 C. At a temperature of 800 C in the combustion chamber, 99.8% of all combustible matter is burned entirely. Xylene must be burned at least at 670 C, and formaldehyde at 720 C. Depending on the integration of the heat exchanger into the production process, three types of afterburners can be distinguished: the non-integrated, the partially integrated, and the fully integrated thermal afterburning system. Through integration of the afterburning process into the actual plant, the costs for waste gas cleaning can be drastically reduced. A detailed description of all three arrangements of afterburners is given.

16599 APTIC NO. 34336

Zlatin, L. E., G. I. Trondina, Yu. P. Artamonov, A. L. Shtein, and Yu. D. Yukhonovets

DENITRATION OF SULPHURIC ACID FOR THE PRODUCTION OF AMMONIUM SULPHATE. *Coke Chem. (USSR) (English translation from Russian of: Koks i Khim.), no. 3:43-44, 1970. 4 refs.*

At a Soviet coke and chemical plant, ammonium sulfate is made from spent 72-73% sulfuric acid taken from the nitrobenzene plant. The nitrogen oxides contained in this acid contaminated the coke oven gas, rendering it unsuitable for subsequent use for ammonia synthesis. Thorough denitration of the sulfuric acid is now effected by adding urea to the acid and agitating the mixture with compressed air. The compressed air also serves to remove the nitrogen formed as the urea reacts with the nitric oxides. The removal of the nitrogen accelerates the reaction between the nitric oxides and the urea. A sulfuric acid storage tank is used as the denitration vessel, and the process reaches completion in three to four hours. When the ammonium sulfate plant is operated with acid denitrated in this way, the nitric oxide content of the coke-oven gas remains unchanged.

MEASUREMENT METHODS

16600 APTIC NO. 34410

DUST MEASURING UNIT. *(Staubmessgeraet). Text in German. Umwelt 0(Duesseldorf), 1(5):56-57, 1971.*

The dust monitor FH 62 A consists of three units: the sampling unit, the main unit, and the recorder. The monitor can be installed into stationary measuring stations or into mobile stations. The unit continuously measures and records dust concentrations. The dust filtrate from each individual measurement remains on the filter band for subsequent qualitative examination. The monitor has a measurement range of 0.005 to 11 mg/cu m referred to a constant air throughput of 1.2 cu m/h. If pumps with higher capacity are used, a larger measurement range can be obtained.

16601 APTIC NO. 34422

AUTOMATIC SYSTEM MONITORS PULP MILL GASEOUS EMISSIONS. *Can. Pulp Paper Ind. (Vancouver), 24(10):57, Oct. 1971.*

An automatic monitoring system was designed to meet the demands of proposed British Columbia legislation requiring the measurement of sulfur compounds in all gaseous emissions from pulp and paper mills. The system directly measures hydrogen sulfide, sulfur dioxide, and total sulfur from 0.1 ppm to several thousand ppm, and can also be used to measure methyl mercaptan, ethyl mercaptan, methyl sulfide, and dimethyl sulfide. The new system features a sulfur-phosphorus detector with a hydrogen-rich flame, a gas chromatograph, a permeation-tube calibration unit, and a gas-sample conditioning unit. The detector is specific to sulfur up to 1.0 microgram. Chromatograph columns are made from polyphenyl ether and phosphoric acid. A stripper column allows separation of H2S and SO2 from the other sulfur compounds present. The H2S and SO2 are then passed to an analytical column and to the detector for separation and measurement.

16602 APTIC NO. 34499

MEASUREMENT AND CONTROL IN CEMENT FACTORIES AND RELATED PLANTS. PART 3--ROTARY KILNS AND SHAFT KILNS (A). *Test., Instrum. Controls, 6(6):17-34, June 1969.*

The many possibilities of applying instrumentation and control technology to rotary kilns and shaft kilns in cement factories and related plants are indicated. During planning, three basic divisions in the processing of the sample gas should be distinguished: sampling with coarse filtration without condensation; condensation without dust separation; and removal of fine dust without condensation. The gas sampling probe is the first link in the chain of a series of instruments. For the removal of coarse dust without condensation, a heated coarse filter should be used. Next, special electric coolers must be installed for the sampling gas. Fine-filtering is the third and final stage. Accessories and auxiliary components are mentioned. Oxygen analysis, carbon monoxide analysis, and carbon dioxide analysis are described, as well as the interconnection of several gas analyzers. Instead of the earlier insertion-type thermocouples, a measuring method with fixed thermocouples and slip-rings is used today to determine the temperature of the charge in the calcining zone. Circuitry and connecting thermocouples are also indicated. Rotational speed measurement and longitudinal movement must be determined, as well as shell temperature and the temperature of the sintering zone.

16603 APTIC NO. 34503

Study Group on Air Pollution Sampling Network (Japan)

REPORT OF THE STUDY GROUP OF AIR POLLUTION SAMPLING NETWORK. *(Taikiosen sokuteimo kenkyu kai kenkyu hokoku sho). Text in Japanese. 106p., March 1969.*

The activities by the Study Group of Air Pollution Sampling Network for 1968 include observations of the measurement methods of sulfur dioxide, nitrogen oxides, and suspended particulate matter and studies of comparison of the measuring equipment and standardization of the measurement methods. The use of measuring instruments was determined. The analysis of SO2 and nitrogen oxides by measuring instruments was compared with manual analysis. The levels of concentration obtained by the measuring equipment with gas generator were compared with those obtained by manual analysis. Studies were performed of the kinetic evaluation, standardization of the measurement method and absorption by filter paper and air induction tube for SO2 gas; the measurement method of SO2 gas; the measurement method of the quality of air pollution; the measurement method of nitrogen dioxide by the Saltzman method; the measurement method of nitrogen oxides (study of the conversion ratio of nitrogen dioxide into nitrous acid); light scatter particle densitometer; and electroconductivity of the acidic hydrogen perioxide solution by sulfur acid.

16604 APTIC NO. 34504

Study Group on Air Pollution Sampling Network (Japan)

THE RESULT OF EXAMINATION OF THE ERRORS ON TRANSMITTING AIR POLLUTING SUBSTANCES AND METEOROLOGICAL FACTORS. *(Taikiosenshitsu kishoyoso to no densogosa no kentokekka ni tsuite). Text in Japanese. 43p., March 1969.*

Telemetering is carried out in the air pollution control network; the central control system completes the arrangement. The difference between the values obtained from a recorder at a spot using measured data of the oxide by the electroconductivity method and the value recorded at the Central Control Bureau was examined. Taking the value at an observatory station as A, and one obtained at the Central Controlling Bureau as B, the result was obtained by subtracting B from A. The hourly error was within plus or minus 1 ppm; the rate of agreement was approximately 70%. The rate of agreement of daily average value was 70% to 100%. One case occurred where the error was shown seasonally as either (+) or (-); this was not attributable to errors between the sending and receiving apparatus of the telemeter, or to a mistake on reemerging on a recorder, or the difference between the air conditions of the observatory station and the Central Control Bureau.

16605 APTIC NO. 34507

Japan Environmental Sanitation Center, Tokyo

STUDY ON STANDARIZATION OF MEASUREMENT METHODS OF AIR POLLUTION. *(Taikiosensokuteiho no hyojunka ni kansuru kenkyu). Text in Japanese. 380p., March 1968.*

Standardization of measurement methods for dust fall, floating dust, and sulfur oxides was studied by 17 institutes of public health in Japan. Three methods using the English standard deposit gauge, simple deposit gauge designed by the Pharmaceutical Society of Japan, and dust jar were compared for dust fall; the dust jar method was convenient and had many advantages, judging from the collecting efficiency, transportation, and man-power involved. The following methods of measuring sulfur oxides were investigated: comparison of shelters of Kawasaki square type, Hyogo square type, and Aichi round type used in the Pb02 method; effects of factors on measurement by the Pb02 method; comparison of results measured by the electroconductivity and pararosaniline methods; reasons for differences among measured values of SO2 in the air by the electroconductivity and pararosaniline methods; interfering substances to measurement by the electroconductivity and pararosaniline methods; and measurement methods for sulfuric acid mist. The investigated items for measuring floating dust were as follows: sampling apparatus of dust designed by the Public Health Institute of Wakayama Prefecture, its handling method, measurement results of dust using this apparatus, measurement of dust concentration, the particulate diameter and distribution of particulates, and analysis of chemical composition of dust.

16606 APTIC NO. 34527

ADVANCES IN ELECTRO-OPTICAL MEASURING. *Can. Controls Instrum., 10(118):34-35, Nov. 1971.*

Field trials of a sulfur dioxide/nitrogen dioxide sensor using a remote xenon light source demonstrated a maximum path length capability in excess of 2000 meters and threshold sensitivities of 15 ppm for NO2 and three ppm for SO2. The sensor contains two telescopes to collect light from the remote light source, a two-grating spectrometer for dispersion of the incoming light, a disc-shaped exist mask or correlator, and an electronics system. The correlator functions as a high contrast reference spectrum for matching against the incoming spectra and is composed of circular slit arrays that correlate sequentially in positive and negative sense with absorption bands of the target gas. The light modulations are detected by photomultiplier tubes and processed in the electronics to produce voltage output proportional to the optical depth or burden (ppm-meters) of the gas cloud under observation. Plans to boost the light source will permit the sensor to be operated up to 10 kilometers. The portability of the instrument makes it attractive for pollution measurement over large areas, at a much lower cost than a network of individual monitors.

16607 APTIC NO. 34552

GAS ANALYZER. *(Gasanalysengeraet). Text in German. Umwelt (Duesseldorf), 1(5):58, Oct./Nov. 1971.*

The gas analyzer, Ultramat, operates on the infrared-two-beam- alternating method. It is available for gases which have clear absorption bands in the lower and central part of the infrared spectrum, such as carbon monoxide, carbon dioxide, methane. It can be used for measurement of such gases in flue gases, roasting gases, and rotting gases. It can be used for stationary gas analysis and for laboratory measurements. The receiving chamber is filled with a gas mixture which contains the component which to be measured; the filter chamber is filled with gases enhancing the selectivity.

16608 APTIC NO. 34775

Inst. National de Securite pour la Prevention des Accidents du Travail et des maladies Professionelles, Paris (France)

THIRD SYMPOSIUM ON THE SUBJECT OF DUST. *(Troisieme Colloque sur les Poussieres). Text in French. Colloq. Securite Sociale Serv. Prevent., 3rd, Paris, France, 1955, 120p. 34 refs. (Nov. 3-5.)*

Twenty-four papers presented at an international meeting held in Paris in 1955 are presented. Subjects discussed, with accompanying data, include various types of apparatus for sampling airborne dust based on filtration, thermal precipitation, or photographic methods; quantitative and qualitative examination of airborne dust; quantitative analysis of quartz by thermal differential analysis, X-ray diffraction, and sulfuric acid or phosphoric acid chemical methods; critical content of dust particles in the air from the point of view of health hazards, with special reference to coal mines and the incidence of pneumoconiosis; the risk of silicosis and criteria for environments affected by the generation of silica dust; methods for dust control in mines and industrial shops; and methods for reducing dust generation at the source, particularly for quartz and silica.

16609 APTIC NO. 34872

British Standards Inst., London (England)

USE OF THE RINGELMANN AND MINIATURE SMOKE CHARTS. *Brit. Standard, no. 2742, 8p., 1969.*

The Ringelmann chart should be mounted so as to be held firmly without creases or bending. The portion of the holder adjoining the viewing edge should be neutrally colored, such as aluminum. The chart should be used under daylight conditions, held or fixed facing the observer in a vertical plane, and should be at a sufficient distance from the observer for the lines to appear to merge until each square forms a uniform shade. The darkness of the smoke at the point where it leaves the chimney should be compared with the shades on the chart. The miniature smoke chart has gray shades arranged to correspond to the shades on the Ringelmann chart. The chart is designed for use at a distance of less than 2 m from the observer s eye. Since the card on which the chart is printed is slightly translucent, the chart is to be backed when in use by a loose sheet of white opaque material.

16610 APTIC NO. 34990

Study Group on Air Pollution Sampling Network (Japan)

REPORT OF INVESTIGATION ON MANIPULATION OF INSTRUMENTS FOR AIR SAMPLING AND QUANTITY MEASUREMENT. *(Taiki osen sokuteikiki toriatsukai yoryo no kento kekka hokoku). Text in Japanese. 225p., March 1970.*

Guides for manipulation of seven types of automatic recording instruments for sulfur dioxide, two types for nitrogen oxides, two methods for carbon monoxide, one type for hydrocarbons, a digital dust counter, and an instrument for meteorological measurements were shown. After discussing the outline of measurement methods by each instrument and problems related to them, standards of type, size, and weight, schematic diagrams, methods of manipulation (including preparation of reagents), and inspection of recorded samples were explained in detail. Management and inspection of instruments, and countermeasures for troubles were illustrated when necessary. Measurement methods included the West-Gaeke method, electroconductivity, potentiometry, chromatography, photometry, and spectrometry.

16611 APTIC NO. 34779

Abbiss, J. B.

THEORETICAL ASPECTS OF THE DETERMINATION OF PARTICLE-SIZE DISTRIBUTIONS FROM MEASUREMENTS OF SCATTERED LIGHT INTENSITY. *Royal Aircraft Establishment, Farnborough (England), TR-70151, 45p., Aug. 1970. 10 refs.*

NTIS, DDC: AD 721089

The technique of determining the distribution of particle sizes in a cloud by measuring the intensity of light scattered from it over a range of angles is discussed, and the feasibility of the method is demonstrated with the aid of digital computer calculations. The problem of experimental errors is also treated and the results of some calculations using data to which simulated errors have been added are discussed. A means of reducing their effects on the reconstructed function is illustrated with examples. The general relationship between errors in the data and errors of reconstruction is then established by means of a statistical argument. Monodispersion, in which all the particles are of the same size, gives rise to special problems of reconstruction, which are considered in some detail. The application of special weighting functions to the experimental data in order to improve the quality of the reconstituted distribution function is discussed and demonstrated in a particular case. (Author summary modified)

16612 APTIC NO. 34937

Al perin, V. Z. and R. N. Sayfi

ELECTROCHEMICAL GAS ANALYZERS FOR ANALYZING TOXIC AGENTS IN THE AIR. *Zh. Vses. Khim. Obshchestva im. D. I. Mendeleeva, 15(5):500-506, Oct. 9, 1970. 26 refs. Translated from Russian in: Atmospheric Studies At Chemical Enterprises - USSR, p. 39-52, March 9, 1971. Joint Publication Research Service, Washington, D. C.*

NTIS: JPRS-52566

Electrochemical gas analyzers are finding broad application in continuous automated monitoring of pollutants. Their high sensitivity permits them to be used not only in analyzing the air of industrial facilities, but also in atmospheric air where the maximum permissible concentration (MPC) is 10-100 times lower. Of electrochemical methods, conductometric and coulometric methods are most successfully used in industrial sanitation. The conductometric method has been widely used for more than 40 years in analyzing air pollution. Analyzers based on the coulometric method are relatively new; however, their ability to analyze small gas concentrations should result in their increasing use and the extension of the class of analyzable substances. The principle and operation of commercially available conductometric, polarographic, and coulometric analyzers are discussed. Characteristics of the most important sulfur dioxide analyzers are tabulated.

16613 APTIC NO. 34855

Alexander, Robert H.

MISSION 73 AND ASSOCIATED TESTS. *In: Earth Resources Aircraft Program. Status Review. Volume I. Geology, Geography, and Sensor Studies. Geological Survey Washington, D. C., Geographic Applications Program and National Aeronautics and Space Administration, 33p., 1968. 1 ref.*

NTIS: N71-16127

A complex series of remote sensing experiments were conducted in southern California. Specific objectives were to correlate multisensor and ground observations, as well as to evaluate the feasibility of sensors and sensor combinations as data-gathering components in aircraft and, eventually, spacecraft, in four areas of emphasis: land use, urban problems, surface energy balance, and soil moisture. For land use determination, the basic sensor system employed was a camera with infrared film. Most efforts in the study of urban problems was concentrated on two projects, both in the Los Angeles area: the determination of housing quality and residential neighborhood environmental health conditions primarily with data collected by cameras and color infrared film; and the remote measurement of the atmospheric pollutants, nitrogen dioxide and sulfur dioxide, by an absorption spectroscopic technique, correlated with ground measurements of the same pollutants made by the air pollution control districts. Cameras, a radiometer, and a thermal infrared scanner provided airborne sensor data pertaining to the surface energy balance.

16614 APTIC NO. 34631

Altman, Laurence

OPTOELECTRONICS ENGINEERS PIT LASERS AGAINST AIR POLLUTION. PART II. *Electronics, 3(6):64-68, Dec. 6, 1971.*

Lasers for air pollution monitoring are examined. New developments in infrared semiconductor lasers, diode tunable lasers for automobile exhaust determination, tunable spin-flip Raman lasers, and mobile remote monitoring for point sources are reviewed. The lasers could detect sulfur dioxide, nitric oxide, and carbon monoxide. Laser wavelength, with respect to ozone monitoring, is examined.

16615 APTIC NO. 34409

Ash, Robert M. and Jeremiah R. Lynch

THE EVALUATION OF GAS DETECTOR TUBE SYSTEM: CARBON TETRACHLORIDE. *Am. Ind. Hyg. Assoc. J., 32(8):552-553, Aug. 1971. 1 ref.*

Gas detector tube systems for measuring ranges from 10 to 50 ppm were evaluated using 10, 30, and 50 ppm of carbon tetrachloride. Concentration levels and calibration points were determined and the results measured against performance criteria. None of the tubes were satisfactory at even + or 50% accuracy, 95% C.L. The tubes were adequate at best for no more than qualitative determination, since, with poor reproducibility, calibration would be of little value.

16616 APTIC NO. 34408

Axelrod, Herman D., A. F. Wartburg, R. J. Teck, and J. P. Lodge, Jr.

NEW BUBBLER DESIGN FOR ATMOSPHERIC SAMPLING. *Anal. Chem., 43(13):1916-1917, Nov. 1971. 1 ref.*

The typical bubbler for gas sampling is made entirely of glass, and various parts are sealed with standard tapered ground glass joints. The dispersing device is a straight glass tube with an open or fritted glass end. These bubblers are easily damaged and costly to repair. While previous designs were improved upon by incorporating a Teflon top mated to a glass bottom, these improved designs have required precise glass tolerances in the diameter and roundness of the bubbler neck. A new design is described in which the entire unit is machined from 1/2-inch diameter stock Teflon. The top screws onto the bottom of the glass bubbler in a fashion similar to that of a lid onto a jar. The silicone rubber O-ring seals the units along the outer edge of the glass bottom, providing an excellent seal regardless of slight differences in bubbler neck sizes. Incoming air passes through a glass ball joint into the glass stem of the frit, while the exit gases pass through an off-center hole and exit through a polyethylene fitting. The frit is made from ceramic porcelain. The entire system is leak-proof and all parts are interchangeable.

16617 APTIC NO. 35024

Baba, Yoshio

GAS CHROMATOGRAPHY ANALYSIS OF CARBON DIOXIDE, CARBONYL SULFIDE, HYDROGEN SULFIDE, CARBON DISULFIDE, AND SULFUR DIOXIDE MIXTURES. *(Tansan gasu, kabon okishi sarufaido, ryuka suiso, nisanka tanso, aryusan gasu kongobutsu no gasu kuromatogurafu ni yoru bunsekiho). Text in Japanese. Kagaku to Kogyo (Tokyo) (Chem. Chem. Ind.), 24(10):132, Oct. 1971. 5 refs.*

As analytical methods of mixed gases of carbon dioxide, carbonyl sulfide, hydrogen sulfide, carbon disulfide, and sulfur dioxide, various methods are introduced. The R. K. Stevens method was able to analyze continuously less than one ppm SO2 and H2S. Brinkmann s method could not solve the problems of separation of H2S and COS, CO2 and inert gas, or SO2 peak tailing. C. T. Hodges, R. F. Matson, and W. L. Thornsberry could not solve the problem of the SO2 peak tailing either. The Deactigel method of the Applied Science Laboratories succeeded in a complete separation of CO2, COS, H2S, CS2, and SO2 mixtures in two foot by one quarter inch columns. This method is applicable only to concentrations heavier than 50 ppm, but it is simple and takes little time.

16618 APTIC NO. 34815

Barnes, E. C.

THE DETERMINATION OF MERCURY IN AIR. *J. Ind. Hyg. Toxicol., 28(6):257-261, Nov. 1946. 10 refs. (Presented at the American Industrial Hygiene Association, Annual Meeting, 9th, Chicago, Ill., April 9-11, 1946.)*

The maximum allowable concentration of mercury has been established as one milligram per ten cubic meters of air. To determine quantitatively the concentration of mercury in air, the sampling procedure and analytical methods must be such that the sample is truly representative of actual working conditions at the location tested, and the quantity of mercury collected in less than one hour should be such that the analytical method employed will reveal, with a satisfactory degree of accuracy, quantities of mercury between approximately .03 and 10.0 mg per cu m of air. A method is described for the determination of the total mercury concentration in the air, whether present as dust or vapor. It employs the standard impinger for collection of the samples and a simple colorimetric analysis for the determination of mercury by a slight modification of the method of Polejaeff. A potassium iodide-iodine solution is used as the collection medium in the impinger.

16619 APTIC NO. 34311

Beran, Ferdinand and Josef Perkonigg

STUDIES CONCERNING THE METHODS FOR DETERMINATION OF PHYTOTOXIC SULFUR DIOXIDE CONTAINING EMISSIONS. *(Studien zur Methodik der Feststellung phytotoxischer schwefeldioxidhaltiger Emissionen). Text in German. Z. Pflanzenkrankh. Pflanzenschutz, 78(8):449-463, Aug. 1971. 4 refs.*

Investigations were carried out to establish a better basis for the estimation of phytotoxic sulfur dioxide containing emissions. First, an attempt was made to obtain reproducible results with barium tabs in a shorter time than was previously possible. Various sorts of filter paper showed essentially better and more regular results than cotton tabs. An activated carbon filter paper proved to be suitable. By increasing the storing time of thy impregnated tabs before the sampling time, the absorption ability of barium tabs as well as of potash tabs was increased. The paper should be impregnated generally four weeks before they are to be used, and the tabs should be stored in a SO2-free atmosphere. Further studies were carried out with a conductivity method using an automatic apparatus.

16620 APTIC NO. 34329

Berezkin, V. G. and V. S. Gavrichev

ANALYSIS OF GASES CONTAINING NITROGEN OXIDES. *(Analiz gazov, soderzhashchika okisly azota). Text in Russian. Zavodsk. Lab. (Moscow), 37(8):901-902, 1971. 4 refs.*

A complete analysis of a gas mixture consisting of hydrogen, oxygen, methane, carbon monoxide, carbon dioxide, nitrogen, nitric oxide, nitrogen dioxide, and nitrous oxide was carried out by gas chromatography using three activated charcoal columns and helium as a carrier. The first column worked at 145 C and was two meters long. This column was used for the separation of nitrogen oxides from most of the other constituents, which then passed through the next column. This column was one meter long and worked at room temperature. Both the non-separated strip consisting of NO2 and CO2 and the N20 strip which emerged after CH4 was directed by a six way valve into a reactor unit consisting of a quartz tube filled with hydrogen-reduced copper and maintained at 900 C, where complete conversion of NO2 and N20 into N2 occurred. Two N2 and one CO2 peaks emerged from the third column which was 0.2 m long and worked at 150 C. Helium was passed through the system at a 32 ml/min rate. The standardization of the device produced up to 10% deviations from the peak values.

16621 APTIC NO. 34996

Booy, Richard R.

SOME INSTRUMENTATION AND TECHNIQUES FOR MEASURING ENGINE EMISSIONS. *SAE (Soc. Automot. Engrs.) Spec. Pub., no. 365:17-23, June 1971. 15 refs.*

Sources of engine/vehicle emissions are given, along with numerous devices for measuring the various types of emissions. A comprehensive explanation is made of the measuring devices more commonly used for engine exhaust emissions. Flame ionization detectors, spectroscopic analyses, gas chromatography, mass spectrometry, chemiluminescent analyzers, and electrochemical analyzers are described. Sampling systems, instrument calibration, and test procedures are discussed. A modified chassis dynamometer arrangement and an experimental device for following a prescribed vehicle driving cycle are described. Federal regulations for engine exhaust, crankcase, and fuel evaporative emissions are described. (Author abstract modified)

16622 APTIC NO. 34523

Brasser, L. J., L. A. Clarenburg, H. de Graaf, and J. R. Pruys

CONCISE PRESENTATION OF SO2-CONCENTRATION DATA COLLECTED FROM A REGIONAL NETWORK OF VOLUMETRIC SO2 SAMPLERS. *Atmos. Environ., 5(7):505-509, 1971. 1 ref.*

A method is given for compact but nevertheless informative presentation of vast amounts of air pollution data. The percentage of time that a specified gas concentration is exceeded is calculated per station and per period. These percentages are then plotted on a chart covering the network and used to map areas in which the various percentages occur. (Author abstract)

16623 APTIC NO. 34983

Brown, R. and P. G. T. Vossen

SPARK SOURCE MASS SPECTROMETRIC SURVEY ANALYSIS OF AIR POLLUTION PARTICULATES. *Anal. Chem., 42(14):1820-1822, Dec. 1970. 4 refs.*

The advent of an electrical detection system fitted to a spark source mass spectrometer allows the analytical chemist to carry out a survey of all elements from atomic number 92 (uranium) to atomic number 3 (lithium) in one scan. The time taken is no longer than nine minutes. A nitrocellulose filter pad is used for sampling. Sample preparation is discussed, as well as the measurement procedure. An example is cited.

16624 APTIC NO. 34525

Bryckova, E., V. Kleinbauer, R. Vlasak, and F. Konvalina

THE SYSTEM OF TELEMETRIC TRANSFER OF SO2 CONCENTRATIONS IN MEASURED AIR. *(System telemetrickeho prenosu merenych koncentraci kyslicniku siriciteho v ovzdusi). Text in Czech. Cesk. Hyg. (Prague), 16(6):198-200, 1971. 2 refs.*

A telemetry system is described for the relay of sulfur dioxide measurements, with signals and graphic records of the measured concentrations from a distance of 30 km. (Author summary modified)

16625 APTIC NO. 34873

Carpenter, S. B. and R. E. Sparkman

ADAPTATION OF TITRILOG FOR FIELD MOBILE SAMPLING. *J. Air Pollution Control Assoc., 5(4):195-196, Feb. 1956. 2 refs.*

Methods for installation and operation of the Titrilog a continuous, automatic conductivity analyzer, in an automobile and a helicopter are described for the mobile field sampling of sulfur dioxide. Problems with the Thomas conductimetric SO2 analyzer are cited. The layout of the electrical system for the operation of the Titrilog and recorder in an automobile is shown. Frequent calibration is required and a method for calibration of the Titrilog using SO2 is also described. (Author summary modified)

16626 APTIC NO. 34641

Carter, J. A. and J. R. Sites

DETERMINING PPB MERCURY CONCENTRATIONS USING A SPARK-SOURCE MASS SPECTROMETER SAMPLE CHANGER. *Anal. Letters, 4(6):351-355, June 1971. 2 refs.*

A probe-type sample changer has been added to a spark-source mass spectrometer for the rapid determination of ppb levels of mercury by isotope dilution. The initial purpose for adding the changer was to run large sets of fish and environmental samples for their mercury content as rapidly as possible, but the technique has also been used for determining cadmium, mercury, and zirconium in samples of air, water, and urine. Transmittances of the appropriate lines on the photoplate are read on a microdensitometer; calculations are made using a short computer program that applies the emulsion calibration curve and corrects for interfering relative isotopic abundance. (Author abstract modified)

16627 APTIC NO. 34512

Chamberlain, B. R.

SULPHUR DIOXIDE AS A STANDARD FOR THE DETERMINATION OF SULPHUR BY COMBUSTION. *Anal. Chim. Acta, vol. 57:81-92, 1971. 9 refs.*

A comprehensive system is described which enables sulfur dioxide to be used as a standard in the determination of sulfur by combustion at microgram and milligram levels. The sulfur dioxide is injected into the furnace tube by a combination of gas dosing devices, and for accurate analysis the sulfur dioxide must be injected not only in the same quantity but also at the same rate as that released from the decomposing sample. The design and method of usage of the system are outlined. The Sulmhograph consists essentially of a combustion tube, an electrostatic filter, an absorption cell, and a precision pump. Investigations were carried out on the effects of tin, the absorption and dilution of sulfur dioxide, and the use of different standards for the determination of sulfur in tin. This method can be used in air pollution monitoring. (Author summary modified)

16628 APTIC NO. 34845

Chand, R. and R. V. Marcote

EVALUATION OF PORTABLE ELECTROCHEMICAL MONITORS AND ASSOCIATED STACK SAMPLING

FOR STATIONARY SOURCE MONITORING. Preprint, American Inst. of Chemical Engineers, New York, 29p., 1971. 1 ref. (Presented at the American Institute of Chemical Engineers., National Meeting, 68th, Houston, Tex., Feb. 28-March 4, 1971, Paper 68C.)

High accuracy electrochemical transducers capable of selectively monitoring nitrogen oxides and sulfur dioxide throughout the 0-5000 ppm range and in the presence of nitrogen, oxygen, carbon monoxide, carbon dioxide, water vapor, and hydrocarbons, have been developed. Unlike most other pollution measurement techniques, the transducers signal output is linear, directly proportional to the pollutants concentration, and independent of the sample flow rate at up to eight standards cu ft per hour. The transducers electrical output is associated with a solid-state amplification and read-out electronic circuit. The sampling conditioning unit provides zero gas, calibration gas, and a conditioning system which cools the gas sample to 110 F or below and filters particulates greater than 60 micron. The evaluation and characteristics of these two instruments are discussed. (Author abstract modified)

16629 APTIC NO. 34999

Cheng, L. and S. L. Soo

CHARGING OF DUST PARTICLES BY IMPACT. *J. Appl. Phys., 41(2):585-591, Feb. 1970. 25 refs.*

The basic mechanism by which dust particles are charged through impact was studied. Redistribution of charges during impact was described in terms of the dynamics of the impacting bodies and of the properties of the materials of the contacting surfaces. An electrostatic probe theory was developed and applied to three cases: single particles, clouds of particles, and turbulent suspensions. Experiments were performed with pulverized coal dust suspended in air, a principal area of application of the electrostatic probes utilizing impact charging. Results showed that the electrostatic probe provides an accurate means for monitoring the flow rate of particles in a dusty suspension. (Author abstract)

16630 APTIC NO. 34432

Christian, C. M., II and J. W. Robinson

THE DIRECT DETERMINATION OF CADMIUM AND MERCURY IN THE ATMOSPHERE. *Anal. Chim. Acta, 56(3):466-470, Oct. 1971. 6 refs.*

Cadmium and mercury in laboratory air were directly determined by passing air samples through an injection furnace, by passing injector effluent through a nitric acid scrubber, and by analyzing the scrubber solutions by atomic absorption. The concentrations of the metals in the ambient atmosphere were then obtained by comparison of absorption measurements with calibration curves. The sensitivity of the method was 1.2 microgram/cu m and 0.02 microgram/cu m for mercury and cadmium, respectively. No evidence of interference by the chemical form of mercury was detected for the compounds studied. Chloro-compounds caused changes in percentage absorption, but the concentrations of organic chlorine compounds used in interference studies were higher than normal ambient concentrations.

16631 APTIC NO. 34591

Colacino, M., G. Dalu, G. A. Dalu, and F. M. Vivona

A COUNTER OF CONDENSATION NUCLEI FOR THE MEASUREMENT OF ATMOSPHERIC POLLUTION. *(Contatore di nuclei di condensazione per misure di inquinamento atmosferico). Text in Italian. Geofis. Meteorol., 20(1-2):15-18, 1971. 11 refs.*

The Nolan-Pollak counter measures the concentration of condensation nuclei from the variation of intensity of a beam of rays passing through an artificially produced fog is described. The attenuation of the beam of light is governed by the concentration of water droplets constituting the fog, and thus on the concentration of condensation nuclei which condense water vapor under conditions of saturation. The counter consists of a source of light, an optical system which produces a light beam, and a photoelectric cell whose output is measured by a galvanometer and recorded. Between the light source and the detector is a chamber of cylindrical shape where the fog is produced. In a non-automatic execution of the counter all valves are operated manually, in the automatic counter the operation is electromechanical. The error in readings is minimal because a series of measurements is always made and an arithmetic mean is calculated. The counter has been tested on two oceanographic voyages and by measurements performed in an urban environment where the concentration of condensation nuclei was of the order of one million nuclei/cu cm. The sensitivity of the counter ranges from about 100 to several tens of thousands of nuclei/cu cm. The counter is resistant to vibrations and other mechanical stresses.

16632 APTIC NO. 34463

Crandall, Willard A.

DETERMINING CONCENTRATION AND NATURE OF PARTICULATE MATTER IN STACK GASES. *Preprint, American Society of Mechanical Engineers, New York, 16p., 1971. 27 refs. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D. C., Nov. 28-Dec. 2, 1971, Paper 71-WA/PTC-8.)*

Determination of the concentration and the nature of particulate matter in the combustion gases emitted from large boilers and incinerators is an engineering challenge of major proportions. Current state-of-the-art for determining average particulate concentration by weight in gases flowing through large ducts, particle size distribution, and other properties of the particulates is not adequate to meet present and future engineering needs. Many research efforts in progress are aimed at developing appropriate test apparatus and valid sampling procedures for characterizing particulate emission levels to ensure compliance with proposed air pollution control regulations. The many problems to be solved are discussed, as well as the current work by the American Society of Mechanical Engineers Performance Test Code Committee 21/27 and federal, research, and industrial groups in order to publicize the problems involved in obtaining valid test results. (Author abstract modified)

16633 APTIC NO. 34376

Crosby, M. T. and Pamela S. Hamer

THE DETERMINATION OF QUARTZ ON PERSONAL SAMPLER FILTERS BY X-RAY DIFFRACTION. *Ann. Occupational Hyg., vol. 14:65-70, 1971. 2 refs.*

A method is described for the determination of the quartz content of dust collected by a size-selective personal sampler, using an x-ray diffraction and goniometer assembly. Measurements are made directly on the filter, and silver filters give more satisfactory background values than do the more conventional organic filters. To assess the performance of the silver filters on dust collection and the diffractometer, tests were carried out in both the laboratory and the factory. Future applications envisaged include the estimation of quartz in mixtures where the quartz pattern tends to be partially obscured by other components. (Author abstract modified)

16634 APTIC NO. 34483

Dams, R., R. Heindryckx, and K. van Cauwenberghe

CHEMISTRY AND ANALYSIS OF AIR POLLUTION. *(Scheikunde en analyse van luchtpollutie). Text in Dutch. Ind. Chim. Belge., vol. 36:589-626, 1971. 242 refs.*

Sampling, measurement, and sources are described. The thermodynamics of gas formation are given. Residence times, probable atmospheric reactions, toxological effects, and reaction products are mentioned. Sulfur, carbon, chlorine, and nitrogen compounds, ozone, and hydrocarbons are discussed. Sulfur dioxide analysis uses the following methods: titration, the lead peroxide method, colorimetric methods, iodimetry, conductometric methods, coulometric-potentiometric methods, turbidimetry, flame photometry, and gas chromatography. The principles and mechanisms of the formation of photochemical smog are described in detail. Carbon dioxide, carbon monoxide, nitric oxide, nitrogen dioxide, ammonia, and other gases are also discussed with other methods of analysis, such as infrared spectrometry, West-Gaeke method, photometry, and electrochemical methods.

16635 APTIC NO. 34712

Davis, A. J. and A. Lawson

ANALYSIS OF VERY LOW PRESSURE GAS SAMPLES BY CHROMATOGRAPHY. *J. Sci. Instr., vol. 3:471-472, 1970. 2 refs.*

A gas sampling valve is described, suitable for quantitative analysis of gas samples at very low pressures using a gas chromatograph. The valve is contaminant free, can be evacuated to 10 microtorr, and operated successfully at sample pressures down to five mtorr with a reproducibility of two percent. It comprises a body, end caps, and valve actuating assemblies. A seal on the sliding action of the valves is made by O-rings. These prevent the carrier gas leaking out of the valve to the atmosphere, and hence do not affect the vacuum or sampling properties of the valve. The body and end caps are machined from high density polyethylene, which was chosen for its lightness, ease of machining, good outgasing properties, and chemical inertness. All external connections to the body are made by glass or metal tubes, with O-ring seals and clamping plates. Operation of the valve is described. (Author abstract modified)

16636 APTIC NO. 34395

Delly, John G., John Gavrilovic, Gene R. Grieger, and Ian M. Stewart

MAGNIFYING FOR RESULTS. *Ind. Res., 13(6):46-49, June 1971.*

The use of various microscopes for visual information on clusters of atoms, size and morphology of particles (in criminology), and small particles in the atmosphere is reviewed. The transmission electron microscope and scanning electron microscope can be used in studies of viruses, cell tissue structures, metallurgy, and fractography. Microprobe analysis of small air pollution particles uses the electron microprobe, the ion microprobe, which combines the features of the electron microprobe, and the mass spectrometer for the microanalysis of solids, functional group analyses on organic compounds in trace quantities, and detection of isotopes.

16637 APTIC NO. 34407

Dittrich, Thomas R. and C. Richard Cothern

ANALYSIS OF TRACE METAL PARTICULATES IN ATMOSPHERIC SAMPLES USING X-RAY FLUORESCENCE. *J. Air Pollution Control Assoc., 21(11):716-719, Nov. 1971. 25 refs.*

Trace metals collected on filter paper by a high-volume air sampler were analyzed using x-ray fluorescence. A bremsstrahlung exciting source, used to produce the x-rays, was more efficient than the gamma ray exciting source. Metals detected in the samples included titanium, iron, copper, zinc, lead, cadmium, and tin. Elements in the periodic table between titanium and cesium had a sensitivity limit of 0.5 micrograms/cu m of air. Experimental and operational procedures of x-ray fluorescence are reviewed. (Author abstract modified)

16638 APTIC NO. 34462

Downs, W. and S. S. Strom

NEW PARTICLE SIZE MEASURING PROBE – APPLICATION TO AEROSOL COLLECTOR AND EMISSIONS EVALUATIONS. *Preprint, American Society of Mechanical Engineers, New York, 7p., 1971. 3 refs. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D. C., Nov. 28-Dec. 2, 1971, Paper 71-WA/PTC-7.)*

Particle size distribution of particulate emissions is a basic parameter used for designing and selecting certain industrial gas cleanup equipment. However, a cloud of uncertainty about the validity of present methods used for particle size distribution measurements has produced a technological gap. A sampling system was designed and constructed to minimize or eliminate the following effects: probe deposition, thermal precipitation, gravity settling, and eddy circulation created by sudden expansions through jets. The particle size distribution sampling probe is a modular cascade impactor apparatus suitable for sampling dust in a wide range of flue gas conditions. Its primary components are a cyclone separator, a cascade impactor, an absolute filter, and a critical orifice. Operation, mass determination, and data analysis are discussed for the new apparatus.

16639 APTIC NO. 34639

Ensor, David S. and Alan P. Waggoner

ANGULAR TRUNCATION ERROR IN THE INTEGRATING NEPHELOMETER. *Atmos. Environ., 4(5):481-487, Sept. 1970. 21 refs.*

The atmospheric light scattering extinction coefficient measured with an integrating nephelometer has a systematic error resulting from light lost at the angular extremes of the physical integration of scattered light. This error was calculated for typical atmospheric aerosols for the Ahlquist and Charlson instrument. The range of error resulting from angular truncation was from 0 to 22% and depended primarily on the exponent of the Junge particle size distribution and the large particle size cutoff. The error was essentially independent of the particle refractive index, small particle cut-off below 0.1 micron, and the wavelength of light (436-600 nm). The calculated typical error of about 10% agreed with previously published empirical and calculated results. (Author abstract)

16640 APTIC NO. 34356

Eschenroeder, Alan Q.

THE COMPUTER VS. SMOG. *Nat. Cities, 9(11):31-32, Nov. 1971.*

Simulation models are essential to compute the before and after comparison for air pollution, and computer techniques may also provide enforcement officials with episode predictions indicating the number and type of air pollution sources that need to be temporarily shut down. In the development of a model for the Los Angeles basin, good agreement was achieved between calculated and observed ground-level concentrations of hydrocarbons, nitrogen oxides, ozone, and carbon monoxide for daily variations in a five-day heavy smog episode. Each hourly reading of each pollutant gas was averaged for the duration of the episode. Early morning values were used to start calculations and the time history of pollution was computed under the combined influence of station source emissions, vehicular emissions, sun-light ultraviolet intensities and vertical atmospheric diffusion. Two mobile vans with air sampling equipment were employed to keep track of changes in air composition; an airplane was used to observe pollutant rise and dispersion.

16641 APTIC NO. 34826

Fehringer, Daniel J.

METHOD FOR PREPARING LOW CONCENTRATION STANDARD GAS SAMPLES. *Dow Chemical Co., Golden, Colo., Rocky Flats Div., Atomic Energy Commission Contract AT(29-1)-1106, Rept. UC-4-Chem., TID-4500-56 ed., 3p., Feb. 12, 1971. 1 ref.*

NTIS: RFP-1626

A method is described for preparing gas mixtures of 1000 ppm with an accuracy of at least one percent; mixtures of 50 ppm have an accuracy of five percent or better. The method is based on the displacement of an accurately known volume of gas from a cylinder at constant pressure and constant temperature. The number of moles of the gas displaced into the mixing manifold can then be determined, and after the addition of a number of gases, the molar percentage of each gas present can be easily calculated. Results of analyses of mixtures prepared by this method compare favorably with calculated results. These low-concentration gas samples of accurately known composition are needed to serve as standards in the calibration of mass spectroscopy and gas chromatography equipment.

16642 APTIC NO. 34809

Fiocco, G.

THE USE OF OPTICAL RADARS FOR THE DETERMINATION OF ATMOSPHERIC COMPOSITION, MOTION AND TEMPERATURE. *ESRO European Space Research Organization, Paris (France), ESRO-SN-81 Dec. 1968, 24p. 29 refs. (Presented at the ESRO Summer School, 5th, Frascati, Italy, Aug. 1967.)*

NTIS: N70-42503

An important area for the application of optical radar techniques is related to the possibility of separately obtaining echoes from different atmospheric gases by differentiating or enchancing their spectral scattering characteristics. These echoes contain information related to the dimension, composition, and dynamics of atmospheric constituents. The problem of enhancing the scattering effect consists of making the wavelength emitted by the optical radar conincide with the wavelength of the resonant transition of the atmospheric species under study. Ways in which this can be done are considered, and a first approximation is developed for the spectral properties of optical radar returns.

16643 APTIC NO. 34731

Fontana, J. R., G. Hassin, and B. E. Kincaid

REMOTE SENSING OF MOLECULAR POLLUTANTS IN THE ATMOSPHERE BY STIMULATED RAMAN EMISSION. *Nature (London), 234(5327):292-293, Dec. 3, 1971. 6 refs.*

A method for using Raman interactions for pollutant determination is examined. When a laser beam propagates through a mixture of gases, the molecules in the beam can provide signal amplification at any of the Raman wavelengths scattered. The stimulated Raman effect causes a signal of the proper wavelength propagating collinearly with the laser beam to be amplified proportionally to the concentration of the corresponding type of molecule in the mixture. All of the amplified signal can be collected by a detector at the far end of the beam.

16644 APTIC NO. 34684

Foran, M. R., E. V. Gibbons, and J. R. Wellington

THE MEASUREMENT OF ATMOSPHERIC SULPHUR DIOXIDE AND CHLORIDES. *Chem. in Can., vol. 10:33-41, May 1958. 18 refs.*

A method for the measurement of the relative activity of sulfur dioxide at Canadian exposure sites was described. Values obtained over a period of three years were reported. The lead peroxide method was used and factors affecting its variability and correlation with volumetric measurements were investigated. A coating of lead peroxide was applied to a 10-cm square of cotton gauze wrapped around a porcelain cylinder. The lead peroxide coated cylinder was exposed to the atmosphere in a louvered box, which protects the lead peroxide from the direct action of rain but permits free access to air. A desirable feature of the method is that both absorbent and the product formed are insoluble. The sulfur dioxide activity figures obtained by the lead peroxide method correlated very closely with the average sulfur dioxide content of the atmosphere, as determined volumetrically. Eleven methods for measuring chlorides were discussed. The most promising is a modification of the wet candle method and the use of rainfall cans. Chloride levels obtained during a 1956 survey at a number of Halifax locations were given. Brief reference was also made to the performance of two standard metals which were exposed at each of the sites to provide a measure of the relative corrosivity of the atmosphere.

16645 APTIC NO. 35006

Ford, Eric

AUTOMATED EMISSION SAMPLING BY REMOTE CONTROL IN BRITAIN. *Water Pollution Control (Toronto), 109(12):39-41, Dec. 1971.*

The problems of automatic survey procedures and associated data handling have been under investigation for some years at the Air Pollution Division of the Warren Spring Laboratory, Stevenage, England. Measurements required in the field include wind direction, wind speed, wind turbulence, and measurements of sulfur dioxide, carbon monoxide, and unburned hydrocarbons. A battery-operated logging system with magnetic-tape output is utilized. An instrument which combines a wind vane and anemometer simultaneously records wind speed and direction. To develop methods of predicting the behavior of chimneys, a wind tunnel has been installed at the Warren Spring Laboratory. Surveys have been undertaken to determine emissions from motor vehicles, diesel engines, and airport environments.

16646 APTIC NO. 34884

Fry, J. D.

DETERMINATION OF SULPHUR DIOXIDE IN THE ATMOSPHERE BY ABSORPTION IN HYDROGEN PEROXIDE SOLUTION - THE EFFECT OF EVAPORATION ON THE SOLUTION DURING SAMPLING. *Central Electricity Generating Board South Western Region (England), Scientific Services Dept., SSD/SW/M.246, 9p., April 1970.*

A non-specific method for determining atmospheric sulfur dioxide is described that depends on measurements of the net acidity resulting from the absorption in hydrogen peroxide solution of the SO2 with varying, but normally much smaller amounts of other acid and alkaline gases. The increase in acidity due to SO2 absorption is determined by titration to pH 4.5 with standard sodium borate as the alkali. Significant error can occur in the estimation of SO2 for localities with low pollution, due to loss of water by evaporation during sampling. This error leads to the reporting of high results; it can be corrected by making up the absorbing peroxide solution to its original volume prior to estimating the net change in acidity.

16647 APTIC NO. 34464

Gallaer, Charles A.

PRACTICAL PROBLEMS IN EFFICIENT TESTING OF LARGE FLY-ASH PRECIPITATORS. *Preprint, American Society of Mechanical Engineers, New York, 8p., 1971. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D. C., Nov. 28-Dec. 2, 1971, Paper 71-WA/PTC-9.)*

Present-day power boilers and fly-ash collectors are much larger than those for which Performance Test Code 21-1941 was written. Testing such precipitators in strict accordance with the Code requires a large test crew that makes the cost of inevitable delays very high. It is proposed that nonsimultaneous sampling be permitted to reduce the size of the test crew. A two-man crew, assigned to the task for an indefinite period, could sample inlet and outlet locations on successive days and obtain a large amount of test data. When the north precipitator malfunctions, they can test the south inlet. If both precipitators need repair work, they can sample at the inlet, and, if the boiler or the weather prevent testing, only two-man days are lost instead of 12. (Author abstract modified)

16648 APTIC NO. 34939

Gaynullina, E. T. and R. N. Nurmukhametov

POSSIBILITIES OF LUMINESCENT ANALYSIS OF INDUSTRIAL AIR POLLUTION. *Zh. Vses. Khim. Obshchestva im. D. I. Mendeleeva, 15(5):506-513, Oct. 9, 1970. 72 refs. Translated from Russian in: Atmospheric studies at Chemical Enterprises - USSR, p. 53 -67, March 9, 1971. Joint Publications Research Service, Washington, D. C.*

NTIS: JPRS-52566

Organic compounds are distinguished by their luminescence properties. Some have both fluorescence and phosphorescence. These include aromatic condensed hydrocarbons and their derivatives. Others reveal only fluorescence, including many compounds with a chain structure used as luminescence additives in scintillators (polyphenyls, arylethylenes, aryloxazols, and arylxadiazols). The third group exhibits only phosphorescence (many aromatic aldehydes, ketones, quinones, and N-heterocyclic compounds). Brightly fluorescent compounds are easy to analyze by measuring their fluorescence (fluorimetry) and brightly phosphorescent compounds by their phosphorescence (phosphorimetry). Only the former is widespread in luminescent analysis, although the prospects for the latter are increasing. The dependence of luminescence on molecule structure is discussed and comparative data are presented on the sensitivity of luminescent and colorimetric analyses for a number of compounds for example, (benzanthrone, carcinogens, oil, beryllium, mercury, amines, acetylene, phosgene, hydrogen sulfide, mercaptans). The luminescent method has advantages in both sensitivity and speed: maximum optical density with the colorimetric method is achieved in 30-40 min while maximum glow intensity with the luminescent method is achieved in one to two minutes. Although most luminescent analyses are performed with laboratory instruments, automatic gas signal devices using luminescent and chemiluminescent reactions have been developed. Among the luminescent instruments are fluorescent devices for detecting toxic organophosphorus compounds and hydrogen sulfide.

16649 APTIC NO. 34575

Grupinski, Leonhard

DETERMINATION OF CONCENTRATIONS OF CHLORINATED HYDROCARBONS IN AIR BY MEANS OF GAS CHROMATOGRAPHY. *(Bestimmung der Konzentrationen von Chlorkohlenwasserstoffen in Luft mittels Gaschromatographie). Text in German. Staub, Reinhaltung Luft, 31(10):397-399, Oct. 1971. 3 refs.*

For analysis of chlorinated hydrocarbons such as perchloroethylene (CC12:CC12), trichloroethylene (CHC1:CC12), methylene chloride (CH2C12), and chloroform (CHC13), samples are obtained by drawing 5 to 10 liter of air through a fritted gas scrubber containing perchloroethylene or n-decane as an absorbent. The sampling efficiency can be determined by adding a certain quantity of the component to be analyzed to the absorbent in the first scrubber. A similar air quantity, as is used at the subsequent sampling, is then drawn through all connected gas scrubbers, which are also filled with absorbents. The scrubbing efficiency can then be determined with sufficient accuracy. Usually three scrubbers are connected in tandem, each containing 25 ml of absorbent. The sampling speed is 0.5 to 1.0 liter/min. The absorption solution from each scrubber is transferred into a 25 ml measuring flask. The evaporation loss must be replenished. Ten ml of the solution are then injected into the gas chromatograph. The obtained peaks are evaluated with the aid of the calibration curve. The detection limit is 125 mg/cu m air.

16650 APTIC NO. 34458

Guerin, M. R.

DETECTION OF SULFUR-CONTAINING COMPOUNDS IN THE GAS PHASE OF CIGARETTE SMOKES. *Anal. Letters, 4(11):751-759, Nov. 1971. 5 refs.*

The use of gas chromatography with flame photometric detection provides a convenient means of detecting sulfur-containing compounds in the gas phase of cigarette and other types of smoke. Chromatographs generated in this work suggest that cigarettes deliver approximately equal amounts of hydrogen sulfide and carbonyl sulfide, if not more H2S than COS. As yet, no evidence has been found for the presence of sulfur dioxide. The influence of filters was also tested. Results with both Chromosorb 104 and Porapak Q are presented. (Author abstract modified)

16651 APTIC NO. 35005

Harries, P. G.

A COMPARISON OF MASS AND FIBRE CONCENTRATIONS OF ASBESTOS DUST IN SHIPYARD INSULATION PROCESSES. *Ann. Occupational Hyg., vol. 14:235-240, 1971. 5 refs.*

Measurements were made of the mass and fiber concentrations of dust produced during shipyard processes involving asbestos insulating materials. Six Casella type 113A MRE samplers fitted with horizontal elutriators were used for the gravimetric estimations. Hunt personal samplers were used to draw air through 20 mm millipore type GA membrane filters to determine fiber concentration. Comparison of the results of measuring total dust, respirable dust, and fiber concentration show that gravimetric measurements are not suitable for environmental monitoring in Naval Dockyards. The membrane filter technique for estimating fiber concentration is recommended for that purpose. (Author abstract modified)

16652 APTIC NO. 34807

Heck, Walter W.

THE USE OF PLANTS AS SENSITIVE INDICATORS OF PHOTOCHEMICAL AIR POLLUTION. *Preprint, Air Pollution Control Office, Raleigh, N. C., Div. of Effects Research, 19p., 1971. 36 refs.*

Plants are used extensively in monitoring programs and as sensitive indicators of photochemical air pollution. Their usefulness in this respect is based primarily on the sensitivity of selected plant species and/or varieties to specific air pollutants or classes of pollutants. Plants can be valuable indicators of photochemical air pollution in field studies by using either native vegetation or by using plants especially selected for their sensitivity and grown under known conditions. Specific monitoring programs are discussed. The objective of the monitoring program should be clearly defined since plants will not substitute for instrumentation. Plants can provide information on the occurrence and frequency of photochemical air pollution episodes. Limitations are imposed by the plant species chosen, geographical location, funds, and personnel. Ozone, nitrogen dioxide, sulfur dioxide, oxidants, and peroxacyl nitrates can be detected by various indicators. (Author abstract modified)

16653 APTIC NO. 34718

Hoshi, Takashi

POLLUTION SURVEY AND INFORMATION PROCESSING PHOTOGRAMMETRY. *(Shashin sokuryo ni yoru joho hori to kogai chosa). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 7(11):19-25, Nov. 1971. 11 refs.*

Photogrammetry can determine not only the locations of pollutants, but also the absolute quantitative distribution when combined with several on-location measurement data. A negative or positive photograph is divided into a given lattice pattern, and the area of each cross section of lattice covering one sq mm to 0.004 sq mm is considered as one data. The variable density of lattice data is exchanged into electric pressures. A given amount of light is passed through the negative (or reflected on a positive photo) and is collected by condensing lens, which is in turn amplified by a photoelectron amplifier. Electric pressures will be expressed in a continuous wave pattern on a densitometer, which will be recorded on a data recorder. The wave formation on the recorder will be sampled by AD exchanger at a given cycle. The number of effective samplings is determined by a formula, and the data is programmed into an electronic computer. According to the need, crop damages by blight or harmful insects, distribution of land use, distribution of land values, or road density may be calculated by this method. Actual examples of stack gas concentrations in Uji city in Kyoto and Sakai city in Osaka are given with digital maps and distribution maps.

16654 APTIC NO. 34777

Howard, O. H. and C. W. Weber

AN IMPROVED CONTINUOUS INTERNAL-ELECTROLYSIS ANALYZER FOR GASEOUS FLUORIDES IN INDUSTRIAL ENVIRONMENTS. *Am. Ind. Hyg. Assoc. J., vol. 23:48-57, Jan.-Feb. 1962. 8 refs. (Presented at the American Industrial Hygiene Association, Annual Meeting, 22nd, Detroit, Mich., April 12, 1961.)*

An improved, inexpensive analyzer was developed for the continuous determination of gaseous fluorides in industrial environments. The instrument records concentration peaks not detectable by conventional methods. Fluorides, absorbed from the air by a dilute acid solution, produce an electric current in a sensitive, aluminum-platinum, internal electrolysis cell. The continuous signal is readily recorded, or is indicated, without amplification, on a microammeter. The range of the analyzer, which responds to all substances which will yield fluoride ion in the scrubbing solution, is 0.05 to 80 micrograms of fluoride/l of air. Chloride is the only recognized interference. Design, calibration, and response-time are indicated. (Author summary modified)

16655 APTIC NO. 34813

Hulett, L. D., T. A. Carlson, B. R. Fish, and J. L. Durham

STUDIES OF SULFUR COMPOUNDS ADSORBED ON SMOKE PARTICLES AND OTHER SOLIDS BY PHOTOELECTRON SPECTROSCOPY. *Preprint, American Chemical Society, Washington, D.C., 9p., 1971. 4 refs. (Presented at the American Chemical Society, National Meeting, 161st, Los Angeles, Calif., April 1-2, 1971.)*

Photoelectron spectroscopy as a means of air pollution monitoring and as a tool for smoke pollution research was studied. Field samples of fly ash from a power plant and smoke particles from a home fireplace were analyzed. Photoelectron spectroscopy can be used to detect sulfur and determine its chemical state on the surfaces of field specimens of particulate matter. The sulfur peak for the fly ash specimen was remarkably strong, considering that the total sulfur concentration, as measured by combustion analysis, was only 0.15%. This suggests that the sulfur was present mostly as a layer adsorbed on the surface of the particles rather than as a homogeneous component. The photoelectron spectroscopy technique is very sensitive for surface analysis; as little as one monomolecular layer can be detected. The intensity of the fly ash sulfur peak showed that specimens of a much lower concentration (10-100 ppm) can be studied. An advantage of this technique is its specificity in element identification. The binding energies of the inner electron shells of sulfur are sufficiently unique that it is extremely unlikely that other elements will interfere. A high proportion of the sulfur compounds on the surfaces of the coal smoke particles produced in the home furnace were in the more reduced sulfide and sulfite states. This was probably caused by the low combustion efficiency conditions which produced a reducing atmosphere of carbon monoxide. The sulfur species on the fly ash specimen were all in the sulfate form.

16656 APTIC NO. 34546

Huneke, Karl-Heinz

NEW DRAEGER-TUBES FOR GAS ANALYSIS. *(Neue Draeger-Roehrchen). Text in German. Draeger-Heft, (284):36-42, April-June 1971. 4 refs.*

Of the many new Draeger tubes, which are mostly used for measurements in the range of maximum allowable occupational concentrations, the carbon dioxide 00/a plus CO2 two percent/a tube can be used for simultaneous determination of carbon monoxide and CO2 in waste gases for firing systems. The analyzer consists of two individual tubes connected by a combination of metal sleeve and shrinking tube. For determinations of CO and CO2, the sample is drawn through the analyzer. If CO is present, the indicator in the first tube changes from white to brown-green. The concentration can be read from the scale in ppm CO. Carbon dioxide changes the indicator in the second tube from white to purple. The measurement range stretches from two to 12 percent by volume CO2. The analyzer can be used within a temperature range of 10 to 50 C. If the temperature of the gas which is to be analyzed is above this range, it must be cooled in a hot air probe. The CO indication is based on a reaction of this gas with a preparation of iodine pentoxide, selenium dioxide, and smoking sulfuric acid. Interfering gases (hydrocarbons, humidity) are retained in the orange-colored layer. The measurement of CO2 is based on the specific reaction of this gas with hydracine.

16657 APTIC NO. 34540

Jager, J.

DETERMINATION OF POLYCYCLIC AROMATIC HYDROCARBONS IN POLLUTED AIR. *(Stanoveni polycyklickych aromatickych uhlovodiku ve znecistenem ovzdusi). Text in Czech. Cesk. Hyg. (Prague), 16(6):210-219, 1971. 79 refs.*

The determination of polycyclic aromatic hydrocarbons in polluted atmospheres is described. Column, paper, thin-layer, and gas chromatography may be used to separate the substances to be determined, which can then be analyzed by spectrophotometry, phosphorimetry, and fluorimetry at room and very low temperatures. Excitation and emission spectra of fluorescence and phosphorescence are also described. (Author summary modified)

16658 APTIC NO. 34972

Kay, Robert E.

INVESTIGATION OF ANIMAL SENSOR AND SENSOR INFORMATION PROCESSING MECHANISMS FOR APPLICATION TO TARGET ACQUISTION AND TRACKING. (FINAL REPORT). *Philco-Ford Corp., Newport Beach, Calif., Aeronutronic Div., Naval Air Systems Command Contract N00019-70-C-0150, Rept. U-4908, 55p., Feb. 1971. 19 refs.*

NTIS, DDC: AD 720412

Investigations dealing with the analyses of animal sensory and information processing systems are summarized, and two in vitro devices are described which resulted from ideas generated by these analyses. Using the receptor and fast action potentials as endpoint criteria, the effects of odor concentration and quality, temperature, mixing of odors, and duration and frequency of odor stimulus on the interaction of odors with olfactory cell membranes were examined. The potentail usefulness of organic semiconductors in power producing devices has been demonstrated. Spectral sensitivity is considered as a factor in visual target acquisition by insects. The conversion of electromagnetic to electrical energy is examined, and a methyl violet 2B photocell was constructed.

16659 APTIC NO. 34393

King, Robert B. and J. Stuart Fordyce

FILTER HOLDER FOR HIGH VOLUME SAMPLING OF AIRBORNE PARTICULATES. *J. Air Pollution Control Assoc., 21(11):720, Nov. 1971. 1 ref.*

A filter cassette (holder) was developed to eliminate inadvertent contamination of filters during servicing of sampling stations and the collection of filters in high-volume air sampling for trace element analytical work using instrumental neutron activation analysis. The holder prevents contamination caused by poor weather or damaging contact during field work in the context of a multistation monitoring network typically in use in urban centers.

16660 APTIC NO. 34989

Kobayashi, T. and H. Inaba

SPECTRAL ANALYSIS OF ATMOSPHERIC NITROGEN BY LASER-RAMAN RADAR. *Opto-electron., 2(1):45-46, Feb. 1970. 6 refs. (Presented at the Japan Society of Applied Physics, Fall Meeting, Oct. 10, 1969, Sendai, Japan, Paper 10p-G-4.)*

Experimental results of the spectral analysis of Raman scattering by nitrogen molecules in the normal atmosphere are examined. The optical radar system consisted of a Q-switched ruby laser transmitter and a tunable optical receiver. Typical returns displayed sudden increases from noise level to a maximum and subsequent decay as the inverse square of the range. Return powers of the Raman-shifted component from nitrogen and the unshifted components of Rayleigh and Mie backscatters were compared under various meteorological conditions.

16661 APTIC NO. 34940

Korablev, I. V., I. T. Lositskiy, V. M. Matsnev, A. G. Melamed, and V. A. Rylov

APPLICATION OF THE METHOD OF INFRARED ABSORPTION IN ANALYZING MICROADMIXTURES OF HARMFUL AGENTS IN THE AIR. *Zh. Vses. Khim. Obshchestva im. D. I. Mendeleeva, 15(5):537-542, Oct. 9, 1970. 20 refs. Translated from Russian in: Atmospheric Studies at Chemical Enterprises - USSR, p. 119-130, March 9, 1971. Joint Publications Research Service, Washington, D. C.*

NTIS: JPRS-52566

The sensitivity of the absorption method is sufficient to use absorption meters for analyzing traces of gases and maximum permissible toxic concentrations of many vapors and gases in the air of production facilities. Selective sources are finding broad application in absorption meters operating in the ultraviolet range. In the infrared range, where the absorption spectra of practically all gases except single-element and single-atomic gases are concentrated, there are not sufficiently reliable narrow-band sources available to satisfy the requirements of continuous monitoring. Things are much better with respect to selective receivers in the infrared range. Optical-accoustic radiation receivers (OAR) have excellent selectivity and very high sensitivity. These receivers operated on the principle of pressure pulsations caused by directing a continuous flow of infrared radiation to a sealed chamber with a transparent bottom filled with a gas that absorbs infrared radiation. The pulsations cause the gas molecules to go into an excited-state relaxation, leading to an increase in gas temperature and an easily measured corresponding increase in pressure. The stability and selectivity of OAR analyzers is being improved by the creation of instruments operating with a single-beam system. Single-beam instruments for analysis of microconcentrations of impurities appear feasible.

16662 APTIC NO. 34613

Laer, R. Van

DESCRIPTION OF TESTS ON AUTOMOBILES TO FIGHT AIR POLLUTION, ISSUED BY THE COMMITTEE OF EUROPEAN COMMUNITY. *(Beschrijving van de proeven op automobielvoertuigen voorgeschreven door de Raad van de Europese Gemeenschap tot bestrijding van de luchtverontreiniging). Text in Dutch. Ingenieursblad, 40(15-16):439-442, 1971.*

Tests on automobiles and methods of operation are described as used at the laboratory of transportation of the Royal Military School, Brussels, Belgium. The three basic elements of the tests are an experimental setup with a dynamometer for automobiles; measuring apparatus for carbon monoxide, carbon dioxide, and hexane; and plastic bags for collecting the exhaust gas sample. A simulation system is installed to get the torque curve for the electromagnetic dynamometer similar to that of hydraulic dynamometer. In future, this test stand will use a programmed simulation system wherein the program obtained from an automobile run on the road is put on a magnetic tape. This tape can then be used in the laboratory with a robot driving the vehicle. The test stand includes a system to simulate curves on the road, and a system for direct connection of three phases of the vehicle with the brakes of a dynamometer and the inertias. The measuring apparatus allows continuous registration of volume concentrations of CO, CO2, C6 H14, and oxygen. Experiments of Type I, Type II, and Type III are all possible in the laboratory. A correction formula is used to calculate the CO content.

16663 APTIC NO. 34966

Lahmann, E.

TESTING AND EVALUATION OF THE AIR. *(Untersuchung und Beurteilung der Luft). Text in German. Handbuch Lebensmittelchem., vol. 8:1319-1460, 1969. 700 refs.*

Meteorological data, such as air temperature, inversions air pressure, humidity, rain, wind, clouds, and sunshine are discussed. Testing of air composition and pollutants, sampling apparatus, recommended intervals choice of time for sampling, and density of measuring points are also mentioned. Qualitative and quantitative analysis can determine the presence and concentration of the following gases in the air: Oxygen, nitrogen, carbon dioxide, carbon monoxide, hydrogen peroxide, sulfur dioxide, hydrogen sulfide, carbon disulfide, chlorine, chlorine compounds, ammonia, nitric oxide, hydrofluoric acid, and other fluoric compounds. Dust concentration in air can be determined by optical methods. Air sampling can also be used for the purpose of dust determination. The methods and apparatus described include filtering, thermal precipitation, electrostatic precipitation, sedimentation, and use of and impinger. Chemical analysis of dust is given and radioactive particles are determined. All analytical processes are described in complete detail, giving, in addition to the precribed reagents for the absorptive solution required, also working instructions including flow rate of the air being sampled and length of time for which the air flow is to be maintained.

16664 APTIC NO. 34417

Lambert, Jack L. and Philip A. Hamlin

A NEW COLORIMETRIC REAGENT FOR CARBON MONOXIDE. *Anal. Letters, 4(11):745-750, Nov. 1971. 9 refs.*

A new colorimetric reagent for carbon monoxide is described. The reaction sequence apparently involves reduction by carbon monoxide of tetrachloropalladate (II), which then reduces ethylenediaminetetraacetatoferrate (III) anion to ethylenediaminetetraacetatoferrate (II) anion. The latter undergoes ligand exchange with 2,2-dipyridyl or 1,10-phenanthroline to form the more stable colored (FeL3) (2+), which is measured spectrophotometrically. Sodium molybdate enchances the overall reaction. The color intensity produced is nonlinear but reproducible. The method is unique in that a soluble colored compound is produced rather than a metal sol. (Author abstract modified)

16665 APTIC NO. 34589

Leichnitz, Kurt

THE INFLUENCE OF THE SUCKING PROPERTIES OF VARIOUS PUMPS ON THE INDICATION OF TEST TUBES. *(Einfluss des Saugverhaltens verschiedener Pumpen auf die Anzeige von Pruefroehrchen). Text in German. Draeger-Hefte, no. 282:36-44, Oct./Dec. 1971. 5 refs.*

Draeger test tubes for measurement of carbon monoxide and carbon dioxide, attached to various types of pumps for drawing in the air samples, were examined to determine measurement errors that could occur with the various pumps. When Draeger tubes were used with the Draeger gas pump (volume equals 100 cu cm), the indication from the nominal value did not deviate, i.e. systematic error occurred. If a glass pipette was used instead, errors occurred even when the necessary quantity of air was drawn in by the pump within the required time.

16666 APTIC NO. 34533

Loda, Richard T. and Dhanwant S. Sethi

A LOW COST GAS SAMPLING VALVE AND GC SET-UP FOR ANALYSIS OF LOW CONCENTRATION GAS MIXTURES. *Anal. Letters, 4(11):709-714, 1971. 2 refs.*

A simple gas-sampling valve (GSV) and an assembly of constant temperature devices for gas chromatographic column and detector temperature controls were assembled for continuous analysis of carbon monoxide and oxygen in the gas-phase photolysis of carbon dioxide in vacuum ultraviolet. The GSV consisted of three toggle valves with a sample loop. Analysis of mixtures with total pressures less than 0.5 torr was achieved with an irreproducibility of less than three percent. The lower limit for the separation of CO and O2 was approximately 0.0000001 moles for each component. The GSV valve was built at lower cost than commercially available valves, has no moving parts, and can be operated at high temperatures for injection of low-concentration products which are strongly adsorbed on surfaces at room temperature.

16667 APTIC NO. 34938

Lyamin, I. A.

COLORIMETRIC OXIDATION-REDUCTION REACTIONS IN ANALYZING THE AIR OF INDUSTRIAL ENTERPRISES. *Zh. Vses. Khim. Obshchestva im. D. I. Mendeleeva, 15(5):520-528, Oct. 9, 1970. 155 refs. Translated from Russian in: Atmospheric Studies at Chemical Enterprises - USSR, p. 81-101, March 9, 1971. Joint Publications Research Service, Washington, D. C.*

NTIS: JPRS-52566

Reduction-oxidation reactions used for colorimetric analysis of a number of toxic impurities in the air of chemical production facilities are discussed and more than 200 reactions are listed. The majority of the redox reactions used for analytical purposes are accompanied by the transfer of two electrons and their complete trapping on one atom. There are also reactions involving the participation of two electrons which are collected on two atoms but not trapped on either. Reactions with transfer of one electron constitute an appreciably smaller proportion in analytical practice. Such reactions, however, permit the greatest sensitivity of analysis of toxic admixtures in air and procedures for their utilization are under development.

16668 APTIC NO. 34673

Magill, Paul L., Earl D. Lumpkins, and Judith S. Arveson

A SYSTEM FOR APPRAISING AIRBORNE POPULATIONS OF POLLENS AND SPORES. *Am. Ind. Hyg. Assoc. J., 29(3):293-298, May-June 1968. 6 refs.*

A rotating arm impinger system and a method for quantitatively transferring collected particulate matter to glass microscope slides for assessment are described. The collector system employs two vertical bars mounted parallel to the axis of a constant-speed battery-driven motor. A thin coating of Dow Corning 269 Adhesive on the bars serves to retain impinged particles. The collected particles are transferred by pressure contact to microscope slides that have been lightly coated with a silicone compound. The system has a sampling rate of 80 liters per minute. Measured collection efficiency was 54.9% for Paper Mulberry pollen 11-13 microns diameter and 89.5% for P. Graminis spores 14 by 24 microns. (Author abstract modified)

16669 APTIC NO. 34984

Marshall, B. S., I. Telford, and R. Wood

A FIELD METHOD FOR THE DETERMINATION OF ZINC OXIDE FUME IN AIR. *Analyst (London), 96(1145):569-578, Aug. 1971. 9 refs.*

A method for the determination of zinc oxide fume in industrial atmospheres at concentrations up to 20 mg/cu m is examined. The fume was collected on a filter and dissolved in acid; the zinc was determined spectrophotometrically or colorimetrically. The time required for the determination was about 20 minutes. A dynamic method for the generation of atmospheres of zinc oxide is described. (Author abstract modified)

16670 APTIC NO. 34412

Mashek, Vatslav

THE PROBLEM OF DETERMINING THE CONTENT OF ALDEHYDES IN THE AIR. *(K voprosu ob opredelenii soderzhaniya al degidov v vozdukhe). Text in Russian. Gigiena i Sanit., 36(8):92-94, 1971. 14 refs.*

The known methods of determination of the content of various aldehydes in the air are surveyed. Using the described methods, the concentration of aldehydes was measured at a heavy-trafficked highway and in the atmosphere of shoe, textile, and furniture industries. It varied from 1-46 mg/cu m. Aldhydes were measured in a mining industry plant, on which there is no literature report. The measurement was done at various locations of the plant 1.5 m above the ground. The concentration was less than 0.26 mg/cu m in the plant and less than 0.066 mg/cu m in the atmosphere.

16671 APTIC NO. 34327

Miura, Koichiro and Koji Seki

ON THE TRACE ANALYSIS OF GAS IMPURITY. *(Kitai no fujunbutsu no biryo bunseki). Text in Japanese. Shinku (Vacuum), 14(8):286-294, 1971. 3 refs.*

Various methods of the trace analysis of oxygen, such as the yellow phosphorus, galvanic cell, ceramic, gas chromatography, and Winkler methods, were examined with regard to their principles, applicabilities, precisions, structures and manners of operation and care, with the use of diagrams. Gases mixed with traceable amounts of oxygen were measured using these methods and results were compared in order to evaluated their precisions. For 0 to 10 ppm dosages, gas chromatography was eliminated. The ceramic method showed the least fluctuation and excellent reliability for various dosages; the Winkler method showed a large fluctuation in lower concentrations. For less than 1 ppm dosages, the results by the ceramic method were quite different from those obtained by other methods, but for dosages more than 1 ppm up to 10, the values obtained by all four methods corresponded generally. For 10 to 80 ppm dosages, the galvanic cell, gas chromatography, and the Winkler method were used; relatively stable and reliable results were obtained by the Winkler method, which consistently showed less than a half of fluctuation indexes showed by the other two methods. None of the above methods was outstanding and completely reliable and that the method for trace analyses must be chosen for each specific case.

16672 APTIC NO. 34529

Moffat, A. J., J. R. Robbins, and A. R. Barringer

ELECTRO-OPTICAL SENSING OF ENVIRONMENTAL POLLUTANTS. *Atmos. Environ., vol. 5:511-525, 1971. 11 refs. (Presented at the American Chemical Society Meeting, 158th, New York, Sept. 12, 1969.)*

The design, application, and present limitations of two prototype electro-optical monitors, or correlation spectrometers, for sulfur dioxide and nitrogen dioxide are reviewed. Laboratory data, the effect of interfering gases, and some early field data are presented. The instruments are a long-path ambient monitor and a point ambient monitor. The former consists of two basic units, namely, the light source and the sensor. The configuration of the sensor optics differs from an earlier remote sensor in the method of focusing at the entrance slit and the addition of a grating scan capability. Readout is usually in the form of a continuous strip chart record and the presentation is centerline bi-polar. Field tests with a mechanically chopped xenon arc source and a 100-m path length indicate that a grating scan rate of 15 A/min and a scan period of two to three min with a chart speed of three in/hr is near optimum. Development of an improved light source should permit path lengths of 2000 m or more. The ambient point correlation spectrometer encloses the absorption cell. In addition to the diffraction grating, only three main optical elements are used. Instrument resolution, defined as peak-to-peak chart noise level, is 10-15 ppb. However, the ability to resolve changes of one ppb at low gas levels was demonstrated. In general, results obtained with the correlation spectrometers are in agreement with those of accepted chemical methods. An important feature of the long-path monitoring technique is the opportunity of obtaining measurements of air contaminants which are truly representative of a sizeable area. More specifically, the possibility of distortion due to localized pockets of high gas concentration is avoided since the method gives an average concentration over its long optical path.

16673 APTIC NO. 34808

Moffitt, A. E., Jr. and R. E. Kupel

A RAPID METHOD EMPLOYING IMPREGANTED CHARCOAL AND ATOMIC ABSORPTION SPECTROPHOTOMETRY FOR THE DETERMINATION OF MERCURY IN ATMOSPHERIC, BIOLOGICAL, AND AQUATIC SAMPLES. *At. Absorption Newslett., 9(6):113-118, Nov.-Dec. 1970. 15 refs. (Presented at the Society for Applied Spectroscopy, Annual Meeting, 9th, New Orleans, La., Oct. 5-9, 1970.)*

A quantitative procedure is described for determining submicrogram quantities of mercury in atmospheric, biological, and aquatic samples by atomic absorption spectrophotometry. In the analysis of biologic and water samples, organically bound mercury is oxidized with nitric acid, and all mercury present is reduced to the elemental state with stannous chloride. The liberated mercury is driven by an air current through specially impregnated charcoal for approximately two minutes. A glass tube packed with impregnated charcoal is used to take integrated atmospheric samples. A standard volume of 10 liters is sampled and the tube is capped and returned to the laboratory for analysis. All charcoal samples are analyzed directly for mercury with an atomic absorption sampling boat assembly. Measurement of the recorder peak height is used to determine the quantity of mercury present. The total analysis time is less than five minutes for aqueous samples, and the minimum detectable quantity of mercury is 0.02 microgram. After collection of mercury, the charcoal samples may be stored for later analysis. (Author abstract)

16674 APTIC NO. 34860

Moore, George V. and Burton W. Scott

INLET LEAK STUDY - VOLUME 4 OF 6 FOR COMBINED STUDY PROGRAM. (FINAL REPORT). *Perkin-Elmer Corp., Pomona, Calif., Aerospace Div., National Aeronautics and Space Administration Contract NAS1-9469, SPO No. 30006, NASA CR-111858, 43p., March 1971. 2 refs.*

NTIS: N71-22872

A program was conducted in which an instrument system concept was studied to optimize the application of a mass spectrometer as a sensor for monitoring the primary atmospheric constituents, as well as atmospheric contaminants, in a manned spacecraft. The goal of the direct entry inlet leak development was to provide a molecular flow of sample gas from a sample environment of approximately one-half to one atmosphere into the mass spectrometer ion source, at a maximum pressure of about 0.0002 torr. The advantage of such a system is that it requires no auxiliary pump, such as that required for the existing capillary line pressure divider system. Molecular flow assures a linear relation between the pressure in the ion source and the pressure in the sample environment; and molecular flow allows each of the constituents in the sample gas mixture to flow independently of each other when they enter an ion source. The sintered leak is extremely stable in a normal room environment where no particular effort is made to lower the dust count or the relative humidity.

16675 APTIC NO. 34927

Morrow, Norman L., Rene R. Bertrand, and Homer J. Hall

INSTRUMENTATION AVAILABLE FOR THE MEASUREMENT OF PARTICULATES, SULFUR DIOXIDE AND NITROGEN OXIDES IN THE AMBIENT ATMOSPHERE. *Preprint, American Inst. of Chemical Engineers, New York, 13p., 1971. 15 refs. (Presented at the American Institute of Chemical Engineers, National Meeting, 68th, Houston, Tex., Feb. 28-March 4, 1971.)*

The current and future status of instrumentation to measure sulfur dioxide, the oxides of nitrogen, and particulates in the ambient air, is discussed. Advantages and limitations are described for each of the techniques presented, and a price range is given for the commercially available instruments. Settling and weighing methods are considered for the determination of particulates, as well as tape and hi-volume samplers. Instruments for the measurement of ambient concentrations of SO2 have been built using wet chemistry, electrochemical phenomena, and a spectrometry. Conductometric, coulometric, iodimetric, and colorimetric methods are outlined, as well as the electrochemical and flame photometric methods. Colorimetric and electrochemical methods are also indicated for the determination of nitric oxide and nitrogen dioxide.

16676 APTIC NO. 34863

Mulik, J. D., R. K. Stevens, and R. Baumgardner

AN ANALYTICAL SYSTEM DESIGNED TO MEASURE MULTIPLE MALODOROUS COMPOUNDS RELATED TO KRAFT MILL ACTIVITIES. *Preprint, Southern California Univ., Los Angeles, 23p., 1971. 10 refs. (Presented at the Conference on Methods in Air Pollution and Industrial Hygiene Studies, 12th, Los Angeles, Calif., April 6-8, 1971.)*

Automated chromatographs with flame photometric detectors were developed for qualitative and quantitative analysis of both low and high-molecular-weight sulfur compounds in kraft mill effluents. One chromatograph with a Teflon column packed with Teflon and coated with polyphenyl ether was used to measure the following low-molecular-weight compounds: hydrogen sulfide, sulfur dioxide, methyl mercaptan, ethyl mercaptan, and propyl mercaptan. A second chromatograph resolved the higher-molecular-weight compounds: butyl mercaptan, dimethyl disulfide, dipropyl sulfide, and dibutyl sulfide. Kraft mill effluents with sulfur species at five ppb to percent levels were analyzed with the aid of a six-stage dynamic dilution system. Principal emissions from mills employing the weak black liquor oxidation process were hydrogen sulfide and methyl mercaptan. Sulfur dioxide and hydrogen sulfide were the major pollutants from the strong black liquor oxidation process. (Author abstract modified)

16677 APTIC NO. 34354

Naumenko, E. K.

ON THE POSSIBILITY OF USE OF LASER FOR OBTAINING THE DATA OF THE ATMOSPHERIC AEROSOL MICROSTRUCTURE. *(O vozmozhnosti polucheniya dannykh o mirrostrukture atmosfernogo aerozolya pri lazernom zondirovanii). Text in Russian. Izv. Arcad. Nauk SSR, Fiz. Atmosfery i Okeana, 7(8):911-915, Aug. 1971. 8 refs.*

Lasers working on two frequencies can be used to obtain quantitative information on the microstructure of dispersive media. A polydisperse system consisting of water droplets whose distribution is described by a function of the Gauss function was studied. A laser acting upon a neodymium glass surface at wave lengths of 1.06 and 0.53 micron was used as a light radiation source. Graphs expressing the dependence of the coefficient of light radiation reduction and of the intensity of reflected light upon the half width of the particle distribution curve were obtained. However, these were not useful in determining the region of maximal sensitivity, therefore a generalized parameter such as an average particle size radius had to be used. Thus, graphs finding the particle size range closest to the structure of the dispersive system could be obtained. A nomograph determining the parameters needed for the fundamental function was computed. Using the absolute values of the light radiation reduction coefficient (through the dispersive system) following single scatterings, the particle concentration per volume could be established. This method of laser probing was applicable for systems containing 0.2 to 0.8 micron sized particles, that is, for the structural analysis of atmospheric mists or light fogs.

16678 APTIC NO. 34669

Parts, Leo P., Paul L. Sherman, and Arthur D. Snyder

INSTRUMENTATION FOR THE DETERMINATION OF NITROGEN OXIDES CONTENT OF STATIONARY SOURCE EMISSIONS. VOLUME I. *Monsanto Research Corp., Dayton, Ohio, Dayton Lab., Environmental Protection Agency Contract EHSD 71-30, Rept. MRC-DA-307, 69p., Oct. 1971. 145 refs.*

NTIS: PB 204877

Monitoring instrumentation for nitrogen oxides (nitric oxide and nitrogen dioxide) was evaluated with respect to present and projected requirements in stationary source emissions monitoring, operational characteristics, performance capabilities, and cost/performance criteria. Abstract descriptions are presented for nondispersive infrared, visible, and ultraviolet analyzers, electrochemical techniques, and current prototype methods, including chemiluminescence, gas chromatography, condensation nucleation, correlation spectrometry, dielectric constant measurement, electron excitation, gas phase ionic conductance, inverse radioactive tracing, interference spectrometry, laser radiation absorption, laser Raman scattering, mass spectrometry, paramagnetism, photoionization, and vibrational fluorescence.

16679 APTIC NO. 34960

Peterson, Carl Magnus

AEROSOL AND METEROLOGICAL SAMPLING OF AN URBAN ATMOSPHERE TO DETERMINE PARTICLE DISPERSION CHARACTERISTICS. *Minnesot Univ., Minneapolis, Dept. of Mechanical Engineering, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., 1970, 225p. 105 refs.*

A broad size spectrum particle counting and sizing systems was developed by combining a condensation nuclei counter, an electric particle counter, and a light scattering particle counter, to continuously characterize suspended particulates. The system provides count and size data over a particle size range of 0.001 to about 10 micron with an apparent accuracy of plus or minus 20% of the indicated value. It is stable, automatic, and responds rapidly. The system was combined with meteorological instrumentation on a TV tower to continuously monitor particle number and size, micrometeorological parameters, smoke spot, and sulfur dioxide. Analysis of particle data indicated that air mass stability, measured as a function of the vertical temperature distribution, influenced the particle number concentration to the greatest extent. The effect of direct radiation was also noted. The number-size distributions differed from those described by Junge in magnitude and other respects. The relationship between the average particle number-size distribution curves established in this study, and previously determined percentage deposition curves for particle retention in the human respiratory system, was reviewed for the inversion, stable, and unstable air mass sampling periods to show the level of respiratory loading possible during each sampling condition.

16680 APTIC NO. 34549

Powell, D. L., B. J. Darland, and T. R. Williams

THE DETERMINATION OF TOTAL C-H BY NEAR INFRARED ANALYSIS. *Anal. Letters, 4(7):479-483, July 1971. 5 refs.*

A method for determining total hydrogen bonded to carbon was developed, employing the first overtone of the C-H stretch which occurs in the near infrared spectral region. A Cary Model 14 recording spectrophotometer was used for all readings. Cyclohexane, 2-octene, pentane, cyclohexene, heptane, and 2,2,4-trimethylpentane were employed in this study. Each hydrocarbon gave a linear Beer's Law plot. Mixtures can also be studied with an accuracy of approximately 10%, and the method should find application in the study of pollution by organic materials. (Author abstract modified)

16681 APTIC NO. 34677

Pritchard, William L., Charles E. Schumann, and Charles W. Gruber

SELECTION OF A SUITABLE ADHESIVE-COATED CYLINDER FOR THE COLLECTION OF AIRBORNE PARTICLES. *Am. Ind. Hyg. Assoc. J., 28(6):517-522, Nov.-Dec. 1967. 9 refs.*

The Cincinnati Division of Air Pollution Control, over the past 21 years, has utilized adhesive-coated materials for particulate sampling, for locating sources of wind-blown particulates in the general atmosphere, and for estimating the performance of incinerators in terms of particle emissions. In atmospheric sampling, the adhesive material is wrapped vertically around a 7-cm diameter wide-mouth jar and exposed for seven days. The particle concentrations on the exposed adhesive samplers are then estimated by visual comparison with standards containing known concentrations of particles. Incinerator tests, accomplished by utilizing the same size jar, are evaluated by counting the particles under the microscope. Because of the many advantages such a method offers to an air pollution control agency for the evaluation of particles 20 microns and larger, a research program was undertaken for the development of standard criteria. Collection efficiency was found to increase as the diameter of the cylinder increases, while the height of the cylinder had no appreciable effect. In addition, there appeared to be a correlation on the actual collection efficiencies with the theoretical impingement efficiencies. Additional data indicated that the collection efficiency was related to both the total miles of wind and its speed.

16682 APTIC NO. 34413

Rabinovich, L. M., A. M. Nepomnyschy, A. S. Grischenko, and L. N. Panchenko

A SPECTROPHOTOMETRIC METHOD OF DETERMINING ALDEHYDES IN THE AIR. *(Spektrofotometricheskiy metod opredeleniya al degidov v vozdukhe). Text in Russian. Gigiena i Sanit., 36(8):75-76, 1971.*

A photometric method of determination of the concentration of aldehydes in the air is described, which is based on reaction of aldehydes with fuchsin sulfurous acid. In this reaction, carried out in acidic medium, all aldehydes except formaldehyde lose their rose-violet coloring, while the formaldehyde changes to blue-violet. Maximum absorption spectrum of all aldehydes in neutral medium falls at 540-560 nm, that of formaldehyde in acidic medium at 570-585 nm. The standard solutions of formaldehyde and acetaldehyde were prepared in the following way. Each formaldehyde standard solution was added to one ml fuchsin sulfurous acid, and after 60 minutes one ml of sulfuric acid was added. Ten minutes later, optical density at 580 nm was measured and a calibration curve plotted. Opitcal density of acetaldehyde at 550 nm was measured 20 minutes after the fuchsin sulfurous acid addition and without sulfuric acid addition. For determination of the concentration of aldehydes in a sample, its optical density at 550 nm is measured 60 minutes after fuchsin sulfurous acid addition. The H2SO4 is then added and optical density at 580 nm measured. Calculation is carried out according to formula optical density at 550 nm (i.e. without formaldehyde) equals to total optical density at 550 nm minus optical density at 580 nm (i.e., due to formaldehyde). Concentrations of aldehydes C(2) C(4) and of formaldehyde are found from corresponding calibration curves against measured optical density. Error of determination is 10%.

16683

APTIC NO. 34592

Rat kov, V. M.

ON THE ROLE OF THE AEROSOL ATTENUATION IN THE SPECTROPHOTOMETRIC METHODS OF THE OZONE DETERMINATION. *(O Roli aerozolnogo oslableniya v spectrofotometricheskikh metodakh opredeleniya ozona). Text in Russian. Izv. Akad. Nauk SSSR, Fiz. Atmosfery i Okeana, 7(8):878-884, Aug. 1971. 21 refs.*

Data provided by spectrophotometric measurements of atmospheric transparency in the ultraviolet region were used for the development of an experimental method that distinguishes between the ozone and aerosol components which contribute to reduce the solar radiation. Graphs representing the variation of thickness of the ozone layer on the inverse value of the inclination of solar radiation under conditions of differing atmospheric turbidity are given. A concomittant measurement of the vertical profile and a study of the microstructural features of the aerosol particles are suggested in order to get a better insight into the quantitative aspects of the optical properties of the atmospheric aerosols.

16684

APTIC NO. 34625

Reymont, T. M. and R. J. Dubois

DETERMINATION OF TRACES OF ARSENIC BY COPRECIPITATION AND X-RAY FLUORESCENCE. *Anal. Chim. Acta, 56(1):1-6, Aug. 1971. 6 refs.*

A new method for determining trace amounts of arsenic is described. After suitable sample preparation, arsenic is precipitated as the sulfide from a 3.7 M perchloric acid solution by two percent thioacetamide solution with 200 micrograms of molybdenum as coprecipitant. The sulfide precipitation from highly acidic solution minimizes interferences. After 15 minutes, the precipitate is filtered and the arsenic line is counted by x-ray fluorescence. The method can detect less than a microgram of arsenic and is equally adaptable for arsenic in air, water, soil, or organic material. (Author summary modified)

16685

APTIC NO. 34489

Rickards, A. L. and D. V. Badami

CHRYSOTILE ASBESTOS IN URBAN AIR. *Nature (London), 234(5324):93-94, Nov. 12, 1971. 2 refs.*

A preliminary account is presented of the estimation of chrysotile near a large asbestos textile factory at Rochdale, England. An X-ray diffraction technique based on the measurement of the integrated area under the (002) peak of chrysotile was utilized. The equipment, which consisted of a Phillips 1010 generator, a vertical goniometer with a step scanning attachment, and a proportional counter with pulse height discrimination, could be reliably calibrated down to 10 micrograms of chrysotile, and was cross-checked by estimating the magnesium content of the calibration samples by atomic absorption spectrophotometry. It was only possible to determine an upper limit for the chrysotile concentration which turned out to be three orders of magnitude lower than the threshold value for occupational exposure set by asbestos regulations. The sample was collected with an electrostatic device; the collection efficiency depended on the size distribution.

16686

APTIC NO. 34495

Rissani, Helene

THE LASERS MEASURE AIR POLLUTION. *(Les lasers measurent la pollution de l air). Text in French. Recherche, 2(16):868-869, Oct. 1971. 3 refs.*

Spectroscopic methods play an important part in the chemical analysis of materials. For example, the various components of a mixture of several gases can be identified by the characteristic wavelengths at which they absorb light. The air pollutants can be identified and their concentration can be deduced from absorption spectra in the range of two to 15 micron wavelength. This region contains the absorption bands of most of the known pollutants, namely the oxides of sulfur, carbon, and nitrogen. With the development of lasers for generating intensified light beams, low concentrations could be measured. The Raman spin-flip laser uses a semi-conductor placed into a magnetic field. The energy exchanges between the photons and the semi-conductor create the raman rays corresponding to the excitations of the conducting electrons. A pulsed laser in carbon dioxide is being developed with a pumping power of two kilowatts at 10.6 micron wavelength, and a magnetic field which can attain up to 100 kilogauss magnetic induction. With this device, laser beams variable between 11.7 and 13 micron can be obtained by varying the field between 48 and 100 kilogauss. A similar Raman laser beam of up to one megawatt power has been developed which varies the laser beam wave length between 9 and 14.6 micron. This method has been successfully applied to the determination of nitric oxide, but is fully expected to be suitable for other pollutants. Air samples of as little as one cu cm volume have been sufficient to determine nitric oxide concentrations down to 0.01 ppm.

16687

APTIC NO. 34929

Robbins, Robert C., Kenyon M. Borg, and Elmer Robinson

A NEW CARBON MONOXIDE ANALYZER. *Stanford Research Inst., Menlo Park, Calif., Public Health Service Grant 1 RO1 AP00558-01, 9p., 1970 (?). 10 refs.*

A carbon monoxide analyzer was developed which is capable of continuous measurement of the carbon monoxide concentration in the atmosphere. The operating principle of the instrument is the reaction of carbon monoxide with hot mercuric oxide followed by the photometric determination of the mercury vapor produced. Oxygenated hydrocarbons and olefins are quantitatively detected and therefore present a major interference. However, these are normally present in the ambient atmosphere in low concentrations relative to CO. Hydrogen and methane in the atmosphere do not interfere with the CO analysis. (Author abstract)

16688

APTIC NO. 34798

Rotheram, Mary

CARBON MONOXIDE ACCUMULATOR CELL STUDY. FINAL REPORT, VOL. 1. *Perkin-Elmer Corp., Pomonoa, Calif., Aerospace Div., National Aeronautics and Space Administration Contract NAS1-9469, Perkin-Elmer SPO 30006, 105p., March 1971.*

NTIS: N71 22869

A method for determining 10 ppm carbon monoxide in spacecraft atmospheres was developed. The method is based on sorption on a suitable sorbent, removing air from the system with a vacuum pump, and desorbing CO by heat to a mass spectrometer for analysis. In this system, the pressure due to desorption from the sorbent initially increases and then decreases as the gas is pumped out of the system. The CO signal in the mass spectrometer at the peak of the desorption curve is used as the measure of the amount of CO in the sample. To evaluate the performance of the CO accumulation technique, a small model carbon monoxide accumulator cell was designed and tested on a cycloidal mass spectrometer in three modes of operation. The first mode used vacuum desorption and linear temperature programming; the second, vacuum desorption with a stepped temperature program; and the third, carrier gas desorption with a single step temperature program. The vacuum mode results show what this approach can be used to monitor low CO concentrations. The increase in sensitivity resulting from the stepped temperature program allows the time required for a complete analysis to be reduced with no sacrifice in sensitivity. The carrier gas technique was lacking in sensitivity and reproducibility.

16689 APTIC NO. 34829

Rotheram, Mary and M. R. Stevens

DIRECT ENTRY ACCUMULATOR CELL-MOLECULAR BEAM ION SOURCE. VOLUME 5 OF 6 FOR COMBINED STUDY PROGRAM. (FINAL REPORT). *Perkin-Elmer Corp., Pomona, Calif., Aerospace Div., National Aeronautics and Space Administration Contract NAS1-9469, Rept. NASA-CR-111859, P.-E. Co. Rept. SPO-30006, 51p., March 1971. 6 refs.*

NTIS: N71-22873

The design concept of an ion source is analyzed as part of a program to optimize application of a mass spectrometer for monitoring trace atmospheric contaminants and primary atmospheric constituents in a manned spececraft. The concept of a molecular beam ion source has a modest theoretical advantage over the conventional differentially pumped type, and may be superior in stability. Experimental verification of these advantages are necessary. In particular, the construction of the array of channels required for beam formation and the close placement of the electron beam to the sample inlet must be resolved. Design of an inlet system for trace contaminant analysis with the accumulator cell concept is reviewed; a system that does not require a bypass pumping line appears feasible, if some means can be provided for reducing the cell pressure from atmospheric to about two-tenths of a torr. Sensitivity of about one-tenth to 10 ppm could be realized. Stepped temperature programmed desorption, instead of linear programming, could be used to achieve higher sensitivity; however, analysis would be restricted to relatively simple contaminant mixtures.

16690 APTIC NO. 34496

Sandscheper, Guenter

SNIFFLERS AGAINST ODORS. AIR MONITORING GRID FOR THE NETHERLANDS - STARTS IN THE RHINE ESTUARY. *(Schnueffelpfaehle gegen Gestank. Luftueberwachungsnetz fuer die Niederlande - Anfaenge in der Rheinmuendung). Text in German. VDI (Ver. Deut. Ingr.) Nachr. (Berlin), 25(47):4, Nov. 1971.*

In the Rhine estuary in the Netherlands, one million people reside in an area of 60,000 hectare. The area has at the same time the largest industrial accumulation. For combating air pollution and odors, a grid of 31 measuring stations with a computer center for air quality monitoring has been established. The so-called snifflers (sensors) measure the sulfur dioxide content of the atmosphere 64 times per hour. They also measure the wind strength and determine the wind direction. The computer finds the hourly average SO2 concentration from the transmitted data. The location of the sensors is marked by red lamps on a wall in the computer center. If a set limit concentration over a certain period of time is exceeded, the respective lamp lights up. Measures are then taken. They have been on a voluntary basis, and comprise of use of different fuels and the omission of stack and boiler cleaning. Only SO2 has been measured but the system will be expanded to measure nitrogen oxides and ozone. The measuring stations have been in operation for almost two years. They consist of a casing and the 3 m high pole on top of which is the sampling unit. The sampler draws in the air at a speed of 150 ml/min. The air is cleaned from dust in a glass fiber filter. The filter is heated to avoid SO2 absorption. Then the air is passed through a measuring cell which contains a solution of potassium bromide, sulfuric acid, and bromine in water. The Redox potential is measured and compared with a known reference voltage with two electrodes.

16691 APTIC NO. 34543

Sawicki, Eugene

ANALYSIS FOR AEROTOXICANTS. *Crit. Rev. Anal. Chem., 1(3):275-333, Nov. 1970. 565 refs.*

Increased knowledge of the cellular, viral, and chemical composition of outdoor, enclosed, and concentrated atmospheres in urban, farm, industrial, and wilderness areas in terms of aerotoxicants is necessary for a better understanding and control of the irritant and toxic effects of air pollutants on human beings and other life forms. Carcinogens, allergens, aerocarcinogens, cocarcinogens (including alkanes and phenols), alkylating agents, lachrymators, and phytotoxicants are examined. With the aid of good analytical methods, knowledge can be assembled on the synergistic effects of environmental pollutants with nature-derived and combustion-derived air pollutants. Diseases of commercial and domestic animals which can be attributed to airborne aerosols are also mentioned briefly. Another class of compounds of importance in the lung cancer process are the irritants whose presence in the respiratory environment can interfere with ciliary activity and the flow of the mucous stream. The release and/or blockade of enzymatic activity is believed to be one of the essential features of the allergic reaction. The assay of aeroallergens and the determination of the allergenicity of air pollutants could be accomplished through the assay for histamine released from human (or animal) leukocytes in contact with the allergen. Pesticides and their analysis are reviewed, as well as the determination of the components of air pollution which cause eye irritation (aldehydes, formaldehydes, acrolein, and peroxacyl nitrates). Phytotoxicants include ethylene, sulfur dioxide, ozone oxidants, and fluorides. Analytical methods for these substances include chemical, spectroscopic, fluorescence, chromatographic, colorimetric, spectrophotometric, electrochemical, titrimetric, polarographic, turbidimetric, iodimetric, and skin test methods.

16692 APTIC NO. 34729

Schenk, George H. and Donald R. Wirz

FLUOROMETRIC MEASUREMENT OF AROMATIC HYDROCARBON MIXTURES AFTER THE DIELS-ALDER REACTION OF ANTHRACENE. *Anal. Chem., 42(14):1754-1757, Dec. 1970. 13 refs.*

Anthracene is a troublesome molecule in the fluorometric analysis of aromatic hydrocarbon mixtures because of the widely varying energies of its excited states. If the lowest energy electronic transition of anthracene could be removed, other aromatic hydrocarbons could be selectively excited in the presence of anthracene. The Diels-Alder reaction of maleic anhydride with anthracene can be used in practice to accomplish this. The Diels-Alder adduct of maleic anhydride and anthracene is not fluorescent, and this permits the fluorometric measurement of pyrene, diphenylstilbene, and perylene in the presence of the adduct. The inner filter effect of the adduct was negligible at or below 0.00001 M. Photochemistry of the Diels-Alder Adduct is discussed, as well as reaction conditions and potential applications. (Author abstract modified)

16693 APTIC NO. 34363

Scherbak, Michael P. and Thomas A. Smith

A COLORIMETRIC METHOD FOR DETERMINATION OF TOTAL OXIDES OF NITROGEN IN CIGARETTE SMOKE. *Analyst (London), 95(136):964-968, Nov. 1970. 11 refs.*

A method is described for determining nitrogen oxides present in tobacco. Vapor-phase components of smoke are trapped on charcoal. The trap is eluted with sodium hydroxide solution and the oxidation products of nitric oxide appear as nitrite and nitrate salts. Free acids are released and freed of excess of alkali by an ion-exchange technique. They are then neutralized, made just alkaline, and evaporated to dryness. Residual salts are dissolved in sulfuric acid, iron (II) sulfate is added, and the absorbance of the pink complex is measured. The equivalent concentration of nitrogen oxides is determined from a calibration graph obtained with nitrate standards. Unlike existing methods, the procedure determines both major products of nitrogen oxides in smoke and does not require nitric oxide gas to prepare standards. The method has a coefficient of variation of 5.2%. Results obtained with the method are compared with those for separate determinations of nitrite and nitrate formed by oxidation of the nitric oxide. (Author abstract modified)

16694 APTIC NO. 34584

Schotte, Ursula

LASER APPLIED IN THE FIGHT AGAINST AIR POLLUTION. *(Laser im Einsatz gegen Luftverschmutzung). Text in German. Naturw. Rundschau, 24(11):486-488, Nov. 1971. 3 refs.*

Tunable semiconducter lasers can be used for tracking air pollution sources. The most accurate results are obtained when the laser beam is sent through the gas sample whose pressure has been reduced. Pollutant concentrations of 0.0000001% can be determined. Measurements from a distance of one to two km are feasible. A laser active substance Pb1-xSnxTe is used which can be controlled so that infrared light of the desired wavelength is emitted. A range of 6.5 to 32 micron can be spanned. The laser can be tuned by changing the temperature. The laser operates at very low temperatures of about four K and 77 K. The dimensions of the laser are so small that several lasers can be accommodated in one cooling apparatus. Carbon monoxide and the oxides of nitrogen can be determined by a new laser developed by the Russians.

16695 APTIC NO. 34814

Schweiger, G.

A 90 DEG LASERBEAM SCATTERING EXPERIMENT FOR LOCAL DENSITY MEASUREMENTS. *Preprint, Deutsche Forschungs- und Versuchsanstalt fuer Luft und Raumfahrt, Porz-Wahn (West Germany), Inst. fuer Angewandte Gasdynamik, 23p., 1970. 13 refs. (Presented at the Euromech Colloquim, 18th, Southampton, England, Sept. 16-18, 1970.)*

NTIS: N71 23496

A theoretical study of the different light scattering processes which can occur in gases is given. The intensity of light scattered is proportional to the fourth power of the angular frequency. The radiation scattered by a free electron is completely polarized parallel to the polarization plane of the incident wave. Analysis of frequency shifted radiation offers special possibilities for the gas analysis. Degree of ionization, molecule concentration, dust concentration, and gas temperature can be determined by laser scattering experiments.

16696 APTIC NO. 34433

Sem, G. J., J. A. Borgos, and J. G. Olin

MONITORING PARTICULATE EMISSIONS. *Chem. Eng. Progr., 67(10):83- 89, Oct. 1971. 30 refs.*

Beta radiation attenuation is presently one of the two most promising techniques for automatically measuring effluent particulate mass concentration with the present state of development, primarily because it actually senses a particle parameter very closely related to mass. The piezoelectric microbalance technique, the other most promising technique, also detects particle mass directly. Although the technique shows strong potential, it remains to be proven whether the instrument can be made to operate with coal or oil combustion effluent particles. Adherence of larger particles to the crystal and the cleaning or replacement of loaded crystals may be major problems. This technique is similar in many ways to the beta attenuation technique, but has the additional feature of higher sensitivity, which should allow significantly faster measurements. Light-transmission and light-scattering techniques do not measure particulate mass concentration. Although light-transmission instruments are the most commonly used particulate emissions monitors today, they only measure optical density, a parameter somewhat related to the visual appearance of the stack plume. Limitations of these instruments are discussed. (Author summary modified)

16697 APTIC NO. 34319

Spurny, K., J. Hrbrek, and J. P. Lodge, Jr.

ANALYTICAL METHODS FOR DETERMINATION OF AEROSOLS BY MEANS OF MEMBRANE ULTRAFILTERS. XVIII. AEROSOL SAMPLING UNDER EXTREME GAS CONDITIONS. *Collection Czech. Chem. Commun. (Prague), 36(8):2749-2756, Aug. 1971. 13 refs.*

Fiber filters are frequently used in aerosol sampling and at low and high gas pressures. Therefore, the filtration theory of pore filters (membrane ultrafilters and nuclear pore filters) was extended to filtration under extreme conditions, i.e., the pressure drop and efficiency of the filters were calculated and measured as functions of temperature (150-1300 K) and pressure (1-10,000 torr). The results show that the total efficiency of a pore filter increases with decrease in gas pressure, especially at low gas velocities. For aerosol sampling at low gas pressures (e.g., in high atmospheres), relative large pore size filters can be used. For sampling at high gas pressure, filters with small pore sizes should be applied. From a practical viewpoint, the dependence of total filter efficiency on temperature is not important.

16698 APTIC NO. 34373

Spurny, K. and J. Oppelt

ANALYTICAL METHODS FOR DETERMINATION OF AEROSOLS BY MEANS OF MEMBRANE ULTRAFILTERS. XVII. CONTINUOUS MEASUREMENT OF SOLID AEROSOLS BY MEANS OF MEMBRANE FILTER RIBBONS AND AN AMERICIUM SOURCE. *Collection Czech. Chem. Commun., 36(5):2683-2685, 1971. 7 refs.*

The amount of atmospheric aerosol retained on porous membrane filter ribbons was continuously determined by measuring absorption of alpha radiation from an Americium (241) source. The membrane filters replaced previously used filtration papers and the measurement of radioactive radiation replaced measurement of light absorption. With the Am (241) source, the minimum aerosol concentration measurable with an error less than or approximately plus or minus 20% was about 10 microgram/cu m vs 0.2 mg/cu m for optical measurements. Aerosol concentrations of five microgram/cu m were determined with sufficient accuracy with Nucleopore filters with a square weight of about one milligram. Levels of 50 microgram/cu m were measured in 100 min. The new procedure also includes simplified calibration procedures.

16699 APTIC NO. 34976

Terabe, Motoji

MONITORING OF NITROGEN OXIDES IN AMBIENT AIR. *(Chisso sankabutsu ni yoru taiki osen to monitaringu). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 7(11):3-12, Nov. 1971. 17 refs.*

Various methods of measuring nitrogen dioxides in the air are reviewed with special interest in the Jacobs-Hochheiser method and the NASN method. Discussions include classifications of measuring methods, various maximum allowable concentration standards, and the general principles, mechanism, operation method, capacity, reagent, and maintenance of a conventional automatic measuring equipment for nitrogen oxides. Detailed descriptions, reagents, operation methods, ranges of application, and calculation methods of the Jacobs-Hochheiser and the NASN methods are given. The results of manual analyses by the Saltzman, U.S.P.H.S. ASTM D1607-69, Jacobs-Hochheiser, U. S. Environmental Protection Agency, JIS K0104-1968, and Hygienic Test methods are compared with regards to types of absorption tubes, the quantity of absorbent, gas sampling speed, color reagent, measurement wave length, oxidation of nitric oxide, and calculations. The results of various continuous measuring methods such as Thomas, Saltzman, JIS K0104-1968, Yanagisawa, Beckman, and DKK(GP-5B) are also reviewed by a table, and a flow sheet of the last method mentioned above is presented.

16700 APTIC NO. 34616

Tovshtein, I. V.

ON THE PROBLEM OF DETERMINING TOLUOL AND XYLOL IN THE AIR. *(K voprosu ob opredelenii toluola i ksilola v vozdukhe). Text in Russian. Gigiena i Sanit., 36(8):99-100, 1971.*

In the colorimetric determination of toluene and xylene by the Yanovskiy method (reaction of their nitro derivatives with alkali in ether-alcohol media), sodium hydroxide should be added to all samples and standard solutions at the same time and the intensity of color compared (or the optical density measured) after five to 15 minutes. The character of the color of the product changes, solutions become turbid, and the measurement is not reproducible. The optimum time at which the reaction products are most stable was studied. Pure xylene and toluene and their one to one mixture were nitrated and NaOH added. Optical density was then measured every three minutes for 21 minutes. 21 minutes after NaOH addition, optical density increased by 16-20%, whereas three to six minutes after NaOH addition it changed only slightly. Thus it is considered possible to add NaOH into the samples separately and to measure optical density three minutes after NaOH addition. Results are reproducible.

16701 APTIC NO. 34648

Toyoshima, Kazuo, Norikatsu Hamamura, Kazuma Ishida, Tomokazu Tomita, and Mitsuyo Sugita.

INVESTIGATION ON ERRORS FOR OXIDANTS IN AIR. *(Okishidanto Sokutei no Gosa ni tsuite). Text in Japanese. Aichi-Ken Eisei Kenkyushoho (Rept. Aichi Inst. Public Health), no. 21:135-138, March 1971. 5 refs.*

It was assumed that oxidants flow out from the absorption tube of sampler, during the collection of oxidants by a handy air sampler. Five absorption tubes were connected under four different conditions of oxidant formation, and absorbed amounts in every tube were measured, in order to know whether the method could be applied for practical use. Potassium iodide was used as an absorption solution neutral buffer. An investigation was also performed for reference by measuring alkaline potassium iodide. Total amounts of oxidants flowed out and could be gained when the measurement value in the first tube was multiplied by 1.288. The second tube showed that about 27% of the measurement value of the first tube flowed out. The method could be used, since the standard error was 0.010 ppm. Oxidants which flowed out were also recognized in the alkaline potassium iodide method. But no relation was observed between absorption and the method of formation of oxidants.

16702 APTIC NO. 34308

Tsang, W. and S. P. Wasik

THE APPLICATION OF THE ISOTOPE DILUTION GLC TECHNIQUE TO AIR POLLUTION ANALYSIS. *J. Chromatographic Sci., vol. 9:567-569, Sept. 1971. 9 refs.*

In order to demonstrate the possibilities of the isotope dilution technique using chromatography rather then mass spectrometry, for accurately determining air pollution concentrations, several simple experiments on the quantitative analysis of a representative pollutant, benzene, in the 20 ppm level were carried out. The experimental apparatus comprised a stainless steel storage bulb, a metal sampling tube, and an injection port for sample collection. A twelve foot aqueous silver nitrate column was used for the gas chromatographic column. In one set of experiments the metal sampling tube was coated with a thin layer of glycerol, while in a subsequent experiment the new sample was immersed in liquid nitrogen and the stock sample slowly pumped through the tube for a few seconds. The key to the proper utilization of the isotope dilution technique is an instrument with mass separating capability.

16703 APTIC NO. 34615

Tsendrovskaya, V. A., A. M. Shevchenko, and V. G. Mischenko

DETECTION OF TETRAHYDROBENZALDEHYDE IN THE AIR BY MEANS OF THIN-LAYER CHROMATOGRAPHY. *(Opredeleniye tetragidrobenzal degida v vozdukhe metodom tonkosloynoy khromatografii). Text in Russian. Gigiena i Sanit., 36(7):69-71, 1971. 3 refs.*

A method of detection of tetrahydrobenzaldehyde in the air is described which is based on reaction of tetrahydrobenzaldehyde with 2,4-dinitrophenylhydrazine, carried out in ethylalcohol and followed by separation of a reaction product by thin-layer chromatography on silica gel. The best solvent for separation of the reaction product on a chromatographic plate (spots of yellow color on white background) was n-heptane-ethylacetate mixture (three to one). The sensitivity of the method can be increased when the plate is sprayed with a hydroxide solution (spots of burgundy color are formed). Sensitivity of the method is one microgram. Preparation of reagents and standard solutions for chromatography is described. Concentration of tetrahydrobenzaldehyde is determined by comparison of intensity of coloring of reaction product spot with coloring of standard solution spots. Error is 10%. Method is suitable for determination of tetrahydrobenzaldehyde concentration in the industry.

16704 APTIC NO. 34388

Ulrich, William F.

SOLUTIONS FROM SPECTRA. *Ind. Res., 13(6):52-55, June 1971.*

Aside from the countless routine colorimetric and spectrophotometric methods for water analysis, spectroscopic techniques are applied to a number of difficult and often spectacular problems. At present, the determination of trace mercury is best performed by the so-called flameless atomic absorption technique. For analysis, the water sample is treated with a reducing agent that converts mercury into the atomic state. Then, a gas purge sweeps the mercury, as a vapor, into a gas cell where it is measured by its absorption at 253.7 nm. Phenolics are commonly determined as a group either by a colorimetric procedure or by their own natural absorbance in the ultraviolet. Total organics are first broken down to form carbon dioxide and then determined using a non-dispersive type analyzer. Determination of the chlorinated pesticides, biological species, ozone, and various drugs is also discussed. One promising method for the measurement of bacteria and viruses is based on the bioluminescence observed when adenosine triphosphate reacts with hydroluciferin in the presence of the enzyme, luciferase. An interesting new technique for detecting morphine involves use of electron spin resonance spectroscopy and spin labels.

16705 APTIC NO. 34617

Vengerskaya, Kh. Ya., N. M. Demidenko, T. N. Maiorova, and G. D. Ismailova

METHODS OF DETERMINING CERTAIN DEFOLIANTS IN THE AIR. *(Metody opredeleniya nekotorykh defoliantov v vozdukhe). Text in Russian. Gigiena i Sanit., 36(8):109-110, 1971.*

The conditions of colorimetric and spectrophotometric determination of some defoliants (magnesium chlorate, calcium chloride-chlorate, and acrofol) were studied. On the basis of preliminary experiments, an analysis scheme was worked out. Magnesium chlorate and calcium chlorate-chloride determination is based on the reduction of chlorate ions by Fe(2+) in an acidic medium to chlorides. Fe(3+) formed in the process are then determined in reaction with potassium ferricyanide. Acrofol determination is based on its reaction with pyridine in an alkaline medium, where a colored complex is formed. Acrofol content is determined either photometrically or by standard samples. The sensitivity of determination is two micrograms in a colorimetric volume.

16706 APTIC NO. 34526

Verduyn, G.

AIR CONTAMINATION IN BELGIUM BASIC PRINCIPLES AND MEASURING METHODS. *(Luchtverontreiniging in Belgie. Principes en meetmetoden). Text in Dutch. Ingeneieursblad, 40(11-12):355-361, 1971.*

The measuring network established in Belgium to measure and record air pollutants in the atmosphere is described. Only sulfur and smoke are considered in detail of the different substances casuing air pollution. Smoke and sulfur dioxide are taken as the measure of air pollution. The measurements are of the simpler type, are inexpensive, and were recommended by O.C.D.E. for the study of general pollution levels in the cities and in industrial areas. Measuring methods and the sampling procedure are described in detail. The Belgian network consists of 180 measuring stations as of March 1, 1970. Approximately 50 more are planned to be added in the future. The quantity of smoke is measured by reflectometry. The apparatus consists of a filter, washing tank, automatic switch, gas meter, and pump. A number of charts are included showing SO2 and smoke concentrations around Luik, Antwerp, and Brussels taken during the summer and winter of 1968. Measured values, for example, for the surrounding area of Luik are as follows: summer, 100 micrograms SO2/cu m and 50 micrograms smoke/cu m; and winter, 250 micrograms SO2/cu m and 70 micrograms smoke/cu m. No statistical conclusions are drawn, since the data obtained is for a short duration only.

16707 APTIC NO. 34737

Vogh, James W.

ISOLATION AND ANALYSIS OF CARBONYL COMPOUNDS AS OXIMES. *Anal. Chem., 43(12):1618-1623, Oct. 1971. 21 refs.*

The isolation and collection of carbonyls from complex mixtures as oximes for subsequent chromatographic analysis of the oxime mixture were investigated. The isolation procedure was based on the weak acid properties of oximes which permit separation from hydrocarbons by extraction with pentane. Rentention of oximes in the basic phase was improved by the addition of alcohols and extraction at low temperatures. Complete experimental procedures for the analysis are described and applications to diesel and gasoline-engine exhaust are discussed. (Author abstract modified)

16708 APTIC NO. 34587

Welz, Bernhard

IMPROVED PRECISION, RELIABILITY AND HANDLING OF ATOM ABSORPTION ANALYSIS. *(Verbesserte Praezision, Sicherheit und Bedienung bei der Atom-Absorptions-Analyse). Text in German. Chemiker Ztg. (Heidelberg), 95(20):T99-T102, 1971. 7 refs.*

Atomic absorption is increasingly used for air pollution measurements. A new atomic absorption spectrophotometer was developed. It operates on the principle of single beam light intensity variation. The installed gas control unit insures high operating reliability. The flame is ignited electrically. The explosion-proof burner is made of stainless steel. The unit adjusts automatically to zero and is equipped with a calibration curve corrector. The measured values are indicated in digital form. A deuterium arc lamp is mounted in the lamp room for compensating unspecific light losses which can be caused by molecular absorption or by scattering on solid particles in the flame. The auxiliary device guarantees accurate results in the vicinity of the detection limit, in the presence of high total salt concentrations, and in the remote UV.

16709 APTIC NO. 34595

Zutshi, P. K. and T. N. Mahadevan

OPTIMUM PHYSICAL AND CHEMICAL CONDITIONS FOR THE METHYLENE BLUE METHOD OF ESTIMATING GASEOUS SULPHIDE IN THE ENVIRONMENT. *Talanta, 17(10):1014-1018, Oct. 1970. 17 refs.*

The sensitivity and reproducibility of the Methylene Blue method for gaseous sulfide estimation was investigated with respect to physical conditions and concentrations of reagents, especially sulfuric acid. Absorbance at 675 nm depended on sulfuric acid concentration both at time of the reaction and at time of measurement. Absorbance at 749 nm was entirely dependent on the sulfuric acid concentration at measurement. When sulfuric acid concentration at measurement was about 1.5 M, absorbance at 749 nm was about 20% higher than the maximum at 675 nm. A special sampling bubbler, with a total volume of slightly less than 50 ml, was developed to minimize gas-phase hydrogen sulfide losses. The bubbler is shielded from light during sampling and until the reaction (at 10-15 deg) is performed in it. Capture of hydrogen sulfide is quantitative in this bubbler for concentrations up to 200 microgram/cu m of air at bubbling rates below 3.1/min. Calibration is mentioned.

AIR QUALITY MEASUREMENTS

16710 APTIC NO. 34969

International Business Machines Corp., Gaithersburg, Md., Federal Systems Div.

EMISSION INVENTORY FOR THE STATE OF NEW JERSEY. (FINAL REPORT). *Environmental Protection Agency Rept. BOA 68-02-0043, Task Order 3, 85p., Aug. 27, 1971.*

NTIS: PB 203083

An emission inventory for New Jersey is presented with respect to area description, methodology, sources of information, and emission data for fuel combustion sources (coal, oil, and natural gas); evaporative sources, i.e., gasoline marketing and dry cleaning; mobile sources, including automobiles, diesel powered vehicles, railroads, vessels, and aircraft; and open burning. A total inventory of emission sources and pollutants determined that residential (heating), commercial, and industrial sources, incineration, transportation, power plants, and processing generated 28,005 tons of particulates, 78,068 tons of sulfur oxides, 224,838 tons of carbon monoxide, 49,261 tons of hydrocarbons, and 82,604 tons of nitrogen oxides annually.

16711 APTIC NO. 35025

Ministry of Health and Welfare (Japan)

POLLUTION CONTROL MEASURES. *(Kogai taisaku). Text in Japanese. In: White Paper on Health and Welfare: Children and Society. (Kosei hakusho: kodomo to shakai). p. 304-328, 1971.*

The results of continuous monitoring of sulfur oxides in 1969 show that 130 monitoring locations (61%) in Japan met the environmental standard and 82 locations (39%) failed to meet the standard. In 1968, 62 (40%) of the 155 same monitoring locations failed to meet the standard and 64 (41%) failed in 1969. Seventeen cities in Japan had locations which failed to meet the standard for three consecutive years. In all six locations in Tokyo, where carbon monoxide concentration was continuously monitored since 1964, average concentration of CO increased considerably between 1964 and 1969. Nitrogen oxides measurements in Tokyo also steadily increased for the same period, varying anywhere from 20% to three times over. Settling particulates have markedly decreased since about 1960, due to the installation of dust collectors in various factories and to the change of fuel from coal to petroleum. For instance, in Kawasaki city which was notorious for its soot, settling particulates decreased from 55.6 ton/k sq m/month of 1961 to 29.7 ton in 1969. Most of other cities showed the same tendency for the same period, but Kitakyushu city area seemed to worsen gradually. The average daily amount of suspended particulates in 1968 was 175-425 micron g/cu m, and 140.7-361 micron g/cu m for 1969. The highest daily average was 370-905 micron g/cu m in 1968 and 284-665 micron g/cu m for 1969, showing a slight improvement. Lead seems to have increased in all cities. Health effects of pollution vary from chronic damages to respiratory system, eyes, nose, and skin. Lead poisoning from automotive exhaust gas and photochemical smog effects have occurred in Tokyo. As of June 1971, patients who have been diagnosed as pollution victims are 4052 in all Japan, among which, those who are victims of air pollution are 443 in Kawasaki, 687 in Yokkaichi, 1853 in Osaka, and 1069 in Amagasaki.

16712 APTIC NO. 34761

Chalupa, Kurt

REPORT ON AMBULANT SULFUR DIOXIDE MEASUREMENTS WITHIN THE CITY LIMITS OF VIENNA 1968/69. *(Bericht ueber die ambulanten Schwefeldioxidmessungen im Stadtgebiet von Wien 1968/69). Text in German. Wetter Leben (Vienna), 22(5-6):94-101, 1970. 6 refs.*

Sulfur dioxide levels were measured on 13 occasions (28 days apart) at 21 locations throughout the city of Vienna from November 1968 through October 1969 by conductivity determination with the Pocolux trace gas analyzer. Median annual emission concentrations, frequency distribution, I1 (upper limit of arithmetic mean values), and I2 (upper limit of individual measured values) were calculated. The SO2 concentrations fluctuated between 0 and 0.58 mg/N cu m, with 46% of the values falling within the 0-0.1 mg limit. The all-weather I1 concentration was 0.289 mg SO2/N cu m; the all-weather I2 concentration, 0.680 mg SO2/N cu m. Atmospheric inversions excluded, I1 was 0.176 mg, and I2 0.346 mg SO2/N cu m. On the whole, SO2 concentrations were comparatively low except in center city and during atmospheric inversions. The long-term maximum emission concentration in winter was exceeded in seven localities. The measurements delineated high-and low-pollution sectors of the city. A comparison of winter and summer SO2 concentrations points to domestic heating furnaces as the principal cause of SO2 pollution in Vienna.

16713 APTIC NO. 34992

Chester, R. and L. R. Johnson

ATMOSPHERIC DUSTS COLLECTED OFF THE ATLANTIC COASTS OF NORTH AFRICA AND THE IBERIAN PENINSULA. *Mar. Geol., 11(4):251-260, Nov. 1971. 8 refs.*

Atmospheric dusts were collected off the Atlantic coasts of North Africa and the Iberian peninsula to study the transport of land-derived material into the marine atmosphere. Samples collected by impingers were categorized into three groups according to dust loadings, prevailing wind directions, and source areas. A microscopic counting technique determined particle size distribution. Dust loading off the coast of Morocco averaged less than half those previously reported off the Sahara Desert coast of West Africa. Dust loadings close inshore off the Iberian peninsula were higher than those of the Mid-Atlantic Westerlies by at least an order of magnitude. The mineralogy of the dust collected off the Moroccan coast was similar to that of deep sea sediments deposited in the same latitudes. (Author abstract modified)

16714 APTIC NO. 34890

Dimchev, D.

A STUDY OF ATMOSPHERIC CARBON MONOXIDE POLLUTION AT SOME NODAL POINTS OF AUTOMOTIVE TRAFFIC IN PLOVDIV. *(Izucheniye zagryazneniya okis yu ugleroda atmosfernogo vozdukka v nekotorykh uzlovykh punktakh autotransporta v plovdive). Text in Russian. Folia Med. Cracoviensia (Plovdiv), 9(4):250-258, 1967. 11 refs.*

Air pollution by carbon monoxide was investigated in Plovdiv. A total of 565 air samples were taken in four locations of intense traffic and in one location which was closed for traffic. Carbon monoxide levels exceeding 6 mg/cu m were found in 63% of the cases. Peak concentrations reaching 39.9 mg/cu m and average concentrations of 23.6 mg/cu m carbon monoxide were found in many cases. Automotive traffic was considered to be the main cause of urban CO pollution during the summer season. The specific architectural features of the city of Plovdiv with streets, not appropriate for traffic, were considered as a factor enhancing CO pollution. Carbon monoxide levels appeared to be higher in Plovdiv than in other cities with comparable or more intense traffic. The building of new belt-ways around the city and the electrification of urban traffic as well as the necessity of legislation of technical requirements for automotive vehicles were among the recommendations made to decrease CO pollution in Plovdiv.

16715 APTIC NO. 34320

Gillette, Dale A. and Irving H. Blifford, Jr.

COMPOSITION OF TROPOSPHERIC AEROSOLS AS A FUNCTION OF ALTITUDE. *J. Atmospheric Sci., 28(7):1199-1210, Oct. 1971. 21 refs.*

Aerosol samples collected by three-stage impactors at altitudes to 10 km over six different locations were analyzed by x-ray techniques to determine the composition of tropospheric aerosols as a function of altitude. At locations where concentrations were measured at ground level, most average mass concentrations of chlorine, sulfur, potassium, calcium, and titanium decreased rapidly from the ground to about half or less the ground concentration at one km; more or less constant values were then maintained up to 10 km. Low chlorine concentrations (except near the ocean surface) suggested a small sea salt contribution at higher altitudes. The soil component of the aerosol, indicated by uniform average mass ratios of titanium-silicon, potassium-silicon, and calcium-silicon, was constant with respect to altitude and location. These ratios were distributed virtually log normally; the distribution of the ratios chlorine-silicon and sulfur-silicon was not consistently log normal, presumably due to contributions from pollution sources of these elements. Average concentrations (in micrograms/cu m) at all altitudes ranged from 0.18-1.52 for chlorine; 0.03-0.31 for sulfur; 0.03-0.60 for potassium; 0.01-1.27 for sodium; 0.04-0.76 for silicon; 0.02-2.22 for calcium; and 0.004-0.13 for titanium. Mass median diameters of less than or approximately equal to 0.3 micron were indicated for most of the determined elements. (Author abstract modified)

16716 APTIC NO. 34389

Grob, K. and G. Grob

GAS-LIQUID CHROMATOGRAPHIC-MASS SPECTROMETRIC INVESTIGATION OF C6-C20 ORGANIC COMPOUNDS IN AN URBAN ATMOSPHERE. AN APPLICATION OF ULTRA TRACE ANALYSIS ON CAPILLARY COLUMNS. *J. Chromatog., 62(1):1-13, Oct. 1971. 21 refs.*

Qualitative and quantitative investigations were made on the carbon-6 to carbon-20 volatile organic substances in the air of Zurich, Switzerland. The technique of trace analysis on high resolution capillary columns was developed further. To trap the organics, a specially designed filter was used containing 25 mg of cigarette filter charcoal. Important information about the adsorption/desorption mechanism was obtained by using two or more filters in series. The extraction of the filters with carbon disulfide is described. A mass spectrometer specially designed to meet the requirements of coupling with high resolution gas chromatography was used. The majority of the hundred and eight substances identified were aliphatic and aromatic hydrocarbons. Among substances representing other groups were benzaldehyde and several of the alkyl derivatives which may be oxidation products of aromatic hydrocarbons. The principle of quantitative determination is discussed and is applied to the most volatile part of the spectrum. (Author summary)

16717 APTIC NO. 34473

Guicherit, R.

OXIDATION AIR POLLUTION; MEASUREMENT METHODS AND RESULTS. *(Oxidatieve luchtverontreiniging meetmethoden en meetresultaten). Text in Dutch. Chem. Weekblad., 67(32):F-8 - F14 Aug. 6, 1971. 10 refs.*

Oxidation air pollution consists of reactions of pollutants such as ozone, nitrogen dioxide, nitrogen trioxide, chlorine, and organic and inorganic peroxides in the atmosphere. The most important source of oxidation air pollution is the photochemical reaction between oxides of nitrogen and organic compounds such as some hydrocarbons. Possible sources of oxygen in the open air are described and chemical reactions of ozone production are given. Because of the unstable and very reactive character of the ozone, the detection apparatus must be made only of Teflon and glass. Results of the different methods of ozone concentration measurements are presented. Comparative U. S. measurements of the cumulative frequency distribution of the hourly average oxidant concentration are tabulated with those in Delft during summer and winter. Only nitric oxide and nitrogen dioxide are important from the point of view of air pollution. Measurement methods used, to determine the concentration of NO2 in open air are described. The measurements of NOx and various hydrocarbons are given for different measuring stations. Formation of aldehydes is discussed. Results of measurements of aldehydes and peroxyacyl nitrates are given with a table of concentrations of primary sources of air pollution.

16718 APTIC NO. 35002

Harries, P. G.

ASBESTOS DUST CONCENTRATIONS IN SHIP REPAIRING: A PRACTICAL APPROACH TO IMPROVING ASBESTOS HYGIENE IN NAVAL DOCKYARDS. *Ann. Occupational Hyg., vol. 14:241-254, 1971. 12 refs.*

A survey of the asbestos fiber concentrations associated with work involving asbestos insulating materials was undertaken in the Devonport Dockyard, England. The membrane filter method of sampling and evaluation was used for this survey. Very high concentrations of amosite, crocidolite, and chrysotile asbestos dust exist for variable periods of time in ships being refitted. High concentrations of asbestos dust spread to other parts of the ship in which unsuspecting men worked without respiratory protection. Concentrations of asbestos dust are indicated according to the use of asbestos materials in naval dockyards. The results of sampling after the introduction of preventive measures are briefly presented and these indicate that the precautions are effective in reducing the asbestos dust concentrations in shipyard insulation processes. Protection of the worker includes impervious overalls, an air-fed respirator, or at least a positive pressure power respirator, and adequate charging and washing facilities. Exposure limits are cited. (Author abstract modified)

16719 APTIC NO. 34933

Jutzi, W.

LEAD CONTENT IN STREET DUST AND IN THE STREET AIR OF THE CITY OF ZURICH IN THE SPRING OF 1970. *(Bleigehalt des Strassenstaubs und der Strassenluft in der Stadt Zuerich im Fruehjahr 1970). Text in German. Bull. Eidgenoess. Gesundheitsamtes, Beilage B, no. 3:145-151, March 1971. 2 refs.*

Street dust was collected by means of a brush, particles of a diameter exceeding 0.15 micron were separated, and the lead content of the fine residual dust was determined by emission spectrography. The atmospheric lead content in suspended dust was determined by drawing 40 cu m air/h through a paper filter, mineralizing the filter with the dust, and determining lead content by atomic absorption spectrometry. The tests were performed where identical tests were performed seven years earlier in 1963. A comparison of test results (median level of 0.106% lead in street dust in 1970 against 0.204% in 1963, median level of 3.8 micron lead/cu m in 1970 against a median level of 2.7 microns Pb/cu m in air in 1963) disclosed that, while on one hand atmospheric lead content increased on all sites, the lead content in street dust decreased, also on all sites. The first change can be attributed to the increased number of automobiles in street traffic. There is no explanation for the second change other than that a seasonal low in the spring and the heavy rains preceded the measurements in 1970.

16720 APTIC NO. 34662

Lazrus, A. L., B. Gandrud, and R. D. Cadle

CHEMICAL COMPOSITION OF AIR FILTRATION SAMPLES OF THE STRATOSPHERIC SULFATE LAYER. *J. Geophys. Res., 76(33):8083-8088, Nov. 20, 1971. 19 refs.*

Stratospheric aerosol was collected by means of filters borne by both balloons and aircraft. Sulfate concentrations were higher than those observed by means of impactors. Ammonium sulfate or persulfate were not major constituents of these samples. Concentrations in the tropical stratosphere were not significantly higher than those found in the midlatitudes. The data are discussed with respect to optical observations of the stratospheric aerosol layer during this period. Preliminary oxygen-18/oxygen-16 and sulfur-34/sulfur-32 measurements for stratospheric sulfate are given. (Author abstract)

16721 APTIC NO. 35019

Morishita, Shozo, Youki Ose, Keiko Sasaki, and Masatomo Tachi

STUDIES ON PUBLIC NUISANCE CAUSED BY AIR POLLUTION (IV). AIR POLLUTION IN OGAKI CITY (2). *(Taikiosen ni motozuku kogai ni kansuru kenkyu. (Dai 4 ho) Ogaki-shi no taikiosen. Sono 2). Text in Japanese. Gifu Yakka Daigaku Kiyo (Ann. Proc. Gifu Coll. Pharm.), vol. 20:16-32, June 1971. 3 refs.*

Atmospheric conditions, sulfur dioxide, hydrogen sulfide, and dust fall in the Akasaka District from 1967 to 1969 were measured automatically. The northwesterly wind was most frequent throughout the year, and the average wind velocity was 3.2 3.4 m/sec. The values of both sulfur dioxide and suspended particles tended to become higher from summer to fall. Measurements of sulfur oxides and nitrogen dioxide at 30 places in the city with the alkaline filter paper method gave a high amount of sulfur oxides in the factory area in the west and the south and of nitrogen dioxide along the national highway. The 24-hour measurements of sulfur dioxide and hydrogen sulfide at two places each in the atkctory area in the west and the south and one on the roof of the firehouse showed that hydrogen sulfide did not rise above 0.1 ppm on the average, but sometimes showed high levels. The dust fall at 12 spots in Akasaka insoluble substances (the minimum value 66.9% and the maximum one 89.4%).

16722 APTIC NO. 34978

Nishida, Konosuke, Tsuneo Honda, Takashi Suzuka, Kazuhiko Mitsuoka, and Yoshinori Ishikawa

A PROPOSAL OF AIR POLLUTION INDEX RELATING TO PARTICULATE MATTER - SULFUR OXIDES SYNERGISM. *(Taiki osen inshi no hyokaho ni tsuite - SO2 keizoku jikan narabi ni fuyu funjin no sojo koka). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 7(11):27-37, Nov. 1971. 10 refs.*

Data from 15 locations under the supervision of Osaka Prefectural Public Nuisance Monitoring Center obtained from April 1969 to March 1970 were reviewed and analyzed. Analyses were conducted with regard to the sulfur dioxide concentration duration index, PS value distribution, and PS duration index. The PS value is the multiplication of the highest figures of sulfur oxides and particulates of the day. The PS duration index was obtained by classifying PS index into six classes, the duration and distribution of each class were classified further into five ranks; the duration and the frequency of appearance were multiplied and divided by 10. The results showed that the suburban south Osaka was less polluted than any other areas, and northwest Osaka near Amagasaki had the highest PS index. In general, central Osaka along the Osaka Bay was more heavily polluted than south or east Osaka. One monitoring location in central Osaka along Osaka Bay had the highest PS duration index, and the suburban south Osaka had the least. The locations of least figures in each item coincided, but the locations of most PS index and worst PS duration index did not coincide. This signifies that some areas with relatively light PS index have actually quite seriously advanced pollution problems, but the duration of frequency of occurrences are not as much as some other locations.

16723 APTIC NO. 34403

Noll, Kenneth E. and M. J. Pilat

SIZE DISTRIBUTION OF ATMOSPHERIC GIANT PARTICLES. *Atmos. Environ., 5(7):527-540, 1971. 10 refs.*

The giant atmospheric particle size distribution measured at three locations in Washington (two in Seattle and one on the Pacific Ocean Beach) are similar to previous measurements of the 0.01-1 micron radius range of the atmospheric aerosol. The slope of the giant atmospheric aerosol size distribution averages 2.3 in the 5-25 micron radius range and 6.7 in the 40-100 micron radius range. The average location of the transition zone between the two slope ranges was between 30 and 40 micron radius. The location of this transition zone has a substantial effect on the calculated aerosol mass concentration. The giant atmospheric particles contribute a considerable portion to the calculated mass concentration for the complete atmospheric aerosol size distribution. Rotary inertial impactors and thermal precipitators were used for the determinations. Giant particles are responsible for the fallout of suspended particulate matter, while their surface provides sorption and nucleation sites.

16724 APTIC NO. 34715

Randhawa, Jagir S.

THE VERTICAL DISTRIBUTION OF OZONE NEAR THE EQUATOR. *J. Geophys. Res., 76(33):8139-8142, Nov. 20, 1971. 8 refs.*

An experiment to monitor the ozone concentration in the upper stratosphere and lower mesosphere was performed at the Panama Canal Zone during the first two weeks in November 1970. The rocket-borne ozonesonde, a self-pumping device that incorporated a temperature-sensing bead thermistor on a time-sharing basis with the ozone sensor, was used for this study. Two electrochemical ozonesondes (Mast type) with the AMT-12 radiosondes were flown on balloons, one on November 9 and the other on November 12, 1970. The temperature and ozone data from the tests are presented. An increase in ozone number density was measured at a 50-km altitude from daytime to nighttime. Results are in agreement with the photochemical theory based on oxygen-hydrogen reactions. (Author abstract modified)

16725 APTIC NO. 35010

Ruhling, Ake and Germund Tyler

REGIONAL DIFFERENCES IN THE DEPOSITION OF HEAVY METALS OVER SCANDINAVIA. *J. Appl. Ecology., 8(2):497-507, Aug. 1971. 8 refs.*

Mosses were used as indicators of fallout of airborne heavy metals to determine regional differences in the deposition of heavy metals over Scandinavia. Total calcium, cadmium, cobalt, chromium, copper, iron, potassium, magnesium, manganese, sodium, nickel, lead, and zinc were analyzed by atomic absorption spectrophotometry after wet combustion of the samples. Mean concentrations of Cd, Co, Cr, Cu, Ni, Pb, and Zn from southern Sweden were larger in the southwest than in the northeast. Concentrations of Pb and Cd was more than ten times larger in southwest Sweden than in northern Norway. The deposition of heavy metals/hectare/year was calculated. The regional basic concentrations reflected the fallout from an atmospheric pool to which both neighboring and remote sources contributed. (Author summary modified)

16726 APTIC NO. 34768

Selikoff, I. J., W. J. Nicholson, and A. M. Langer

ASBESTOS AIR POLLUTION IN URBAN AREAS. *Preprint, American Medical Association, Chicago, Ill., 24p., 1970. 38 refs. (Presented at the Air Pollution Medical Research Conference, New Orleans, La., Oct. 5-7, 1970.)*

The spread of asbestos disease into the general environment from the occupational area was noted. Chrysotile asbestos is now a common contaminant of the lungs of New York City residents. There are few data that allow evaluation of the significance of the asbestos found in the lung tissue of urban residents. Ambient air levels were sampled by high-volume and battery-operated personnel monitoring samples at various sites in New York City and scanned by an electron microscopy. Results show a background of chrysotile contamination of the ambient air; this background is considerably higher near urban construction sites. A problem common to all types of asbestos air pollution is the lung lapse period between onset of exposure and appearance of disease. The matter is further complicated by consideration of what is meant by disease caused by asbestos air pollution. There is a problem of identifying neoplasms associated with environmental asbestos exposure against the background of random neoplasms of the same kind not due to asbestos exposure. Natural, industrial, and commercial sources of asbestos are discussed.

16727 APTIC NO. 34387

Sinha, J. K.

HAZARD OF NITROUS FUMES AT A FERTILIZER FACTORY. *J. Inst. Engrs. (India) (Calcutta), 51(10):66-72, June 1971. 14 refs.*

Nitrous fumes (calculated as nitrogen dioxide gas) were measured at three places inside a nitric acid fertilizer plant as well as outside the plant. Samples of air were collected in four impinger tubes connected in series, and nitrite concentrations were determined by photocolorimetric readings. Nitrous fume concentrations were higher inside the plant than in the surrounding atmosphere, and at one location in the plant they were higher than the maximum allowable limit. As the wind velocity increased, the concentration of nitrous fumes at a fixed sampling point was reduced. The concentration of nitrous fumes varied with the distance from the source, reaching a maximum at a particular distance, and thereafter decreasing progressively. Concentrations at a fixed point were changing every moment due a multiple of factors including weather conditions. Diurnal variations were observed. The toxicology of nitrous fumes is reviewed, as well as sources, ground level concentrations, and effective stack height.

16728 APTIC NO. 34379

EARTH ACCRETION IN BLACK SPHERULES. *J. Geophys. Res., 75(2):371-374, Jan. 10, 1970. 6 refs.*

Airborne ferromagnetic particles were collected with an electromagnetic device at 2000 meters altitude and analyzed under an optical microscope to determine the earth accretion rate in black spherules. Concentrations and ratios of iron, nickel, and cobalt were determined in the samples and compared with data from other stations. Particle size range was determined. The extraordinary agreement between the results of the chemical analyses of the three series of samples supports the suggestion that most of the ferromagnetic fallout is independent of the sampling locality and therefore can be of extraterrestrial origin. An improved method for determining particle counts is presented. Results of analogous chemical analyses performed on some Mt. Etna lava samples are also reported. (Author abstract modified)

16729 APTIC NO. 34805

Volvhok, H. L. and M. T. Kelinman

RADIONUCLIDES AND LEAD IN SURFACE AIR. C. *In: Appendix to Health and Safety Laboratory Fallout Program Quarterly Summary Report. Atomic Energy Commission, New York, Health and Safety Lab., HASL-243, p. 1-9, 88-92, July 1, 1971. 4 refs.*

NTIS: HASL-243

The spatial and temporal distribution of nuclear weapons debris and lead in the surface air was studied. Samplers were placed on four Atlantic Ocean weather ships to extend the surface air study over the marine environment. Most of the original Naval Research Laboratory sites grouped grouped along the 80th Meridian (West) were used. For the routine program approximately 1400 cu m of ambient air per day were drawn through a 20 cm diameter Microsorban filter for the land stations. Each sample was split into equal aliquots, one for gamma counting and spectrometry and the other for radiochemistry. Daily pump pressure drop and temperature readings were also submitted along with samples to compute the volume of sampled air. The activity concentrations for all the radionuclide, gross gamma, and stable lead analyses completed to date are tabulated.

16730 APTIC NO. 34375

Volz. F. E.

ON DUST IN THE TROPICAL AND MIDLATITUDE STRATOSPHERE FROM RECENT TWILIGHT MEASUREMENTS. *J. Geophys. Res., 75(9):1641-1646, March 20, 1970. 13 refs.*

The variation of stratospheric turbidity in recent years in midlatitudes and in the tropics as indicated by the amplitude of the 715/477 or 810/500 wavelength color ratio of twilight radiance at 20 deg elevation is investigated. Since late 1963, the stratospheric turbidity in northern midlatitudes has been much higher than it was before the explosion of the Agung volcano in March 1963; a considerable latitude effect is indicated. In the tropics, the stratospheric dust layer was even stronger (and at a greater altitude) in 1969, and very likely was also stronger during the preceding years. There is not much direct evidence that the apparently persistent, yet abnormal, tropical reservoir of stratospheric aerosol was replenished by more recent volcanic activity. (Author abstract)

ATMOSPHERIC INTERACTION

16731 APTIC NO. 34502

Osaka Prefecture (Japan), Public Nuisance Dept.

INVESTIGATION ON THE PLAN OF AIR POLLUTION CONTROL. *(Taiki osen kanri keikaku ni kansuru kenkyu hokokusho. (Osakawan shuhen no kisho narabini taiki osen)). Text in Japanese. 173p., March 1969. 22 refs.*

A study of the characteristics of widely spread pollution around Osaka Bay was performed. A plan for pollution control including forecasting was made by means of collecting climatic conditions and data of air pollution. Management of the committee concerned with the wide spread of air pollution is presented. The characteristics of wide spread pollution including the relationship between eight kinds of distribution of atmospheric pressure and a day with high sulfur dioxide concentration and the relationship between sunshine and high concentration were studied. The distribution of atmospheric pressure on a day when SO2 concentration was more than 0.1 ppm lasted for more than 10 hours. The relationships between wind velocity and SO2 concentration and the characteristics of the distribution of SO2 concentration in many areas in the suburbs of Osaka were studied, including a periodic analysis of wind speed and SO2 concentration. How the wind direction affects SO2 concentration, the problem of stability of SO2 concentration and the relationship between pollution in Osaka and its neighboring prefectures are also presented.

16732 APTIC NO. 34506

Japan Meteorological Assoc. (Japan)

INVESTIGATION ON AMBIENT AIR IN NANYO REGION OF TOKUYAMA. (METEOROLOGICAL INVESTIGATION). *(Tokuyama, Nanyo chiiki kankyo taiki chosa (Kisho chosa no bu)). Text in Japanese. 152p., Dec. 1968.*

Meteorological observations such as vertical distribution of temperature, wind direction and wind velocity at six places of Nanyo region of Tokuyama, Yamaguchi Prefecture were carried out during August 15 20, 1968. The wind from the sea in mid-summer was one of the meteorological characteristics in this region. It began to blow from 9 or 10 am and continued to blow until about 8 pm from the direction of ESE to SE on the ground; with respect to above-ground, it changed to the direction of SE to SSE and SSE to S. The wind blows to the east and the coast line extends in the SE direction; there are mountains of 300 400 m close to the coast line. The velocity of the wind was 2.5 m/sec on the ground, and 4.5 m/sec at the height of 400 m; thus, it correlated with altitude. Temperature inversion was generally slight. Inversion on the ground in early morning was greater in Nanyo-cho than in Tokuyama elementary school at a height of 50 100 m. Its peak was evident at about 5 am and disappeared thereafter for a short time due to the development of sea wind. Inversion on the ground was not observed in the daytime, and continued to be in a state of retention. The frequency of inversions in the sky were small and continued for short periods of time, therefore not causing air pollution.

16733 APTIC NO. 34508

Japan Meteorological Assoc. (Japan)

REPORT ON THE RESEARCH OF AIR DIFFUSION IN KASHIMA AREA IN IBARAGI PREFECTURE. *(Ibaragi-ken Kashima-chiku taikikakusan chosa hokokusho). Text in Japanese. 90p., March 1968.*

In order to obtain basic material that would be useful in preventing atmospheric pollution brought about by the collective development of the Kashima area in Ibaragi Prefecture, an experiment of atmospheric diffusion was made by means of air tracers; estimates were made on atmospheric diffusion from October 24th to 27th, 1967, including vertical distribution of wind direction and velocity within 1000 m from the ground, an estimation of vertical distribution of temperature within 500 m from the ground, fluctuation volume of horizontal and vertical air current, and isolation volume. Atmospheric strata was stable only on the 27th. Fluorescent particles were employed as the tracer, and a Rotorod Sampler was used for collection purposes. The estimating time of tracer concentration was 30 min. The height of smoke origins to release the tracer was assumed to be 150 m, but since no such facilities were available, a helicopter was used to release the tracer; exactly below the helicopter, a low smoke origin was set up. The estimation points were set up at 98 spots on the ground within a sector of an include angle of 144 degrees and of a radius of 8 km; estimation points of vertical distribution of the concentration were set up at eight points within 300 m from the ground by means of a kytoon at the leeward side at 3 km and 5 m. The maximum concentration of the tracer released form the smoke origin at 150 m appeared 1.3 1.5 km leeward on the 25th and 26th, 1.5 20 km on the 24th and 25th, and 3 km on the 27th. The Pasquill stability on the 25th was between C and D.

16734 APTIC NO. 34509

Japan Meteorological Assoc. (Japan)

REPORT ON THE SURVEY OF ATMOSPHERIC DIFFUSION IN OITA DISTRICT. *(Oita-chiku taikikakusan chosa hokokusho). Text in Japanese. 136p., March 1969. 4 refs.*

Measurements of the distribution of density and the area of atmospheric diffusion were performed from August 22 29, 1968, using air tracers. Seven experiments were conducted and simultaneous scattering was done at intervals of 30 min from a point 5 m above the ground and from an F.D. special sprinkler suspended from a helicopter which took a circular flight course with a semi-diameter of 200 m. There were 98 spots for collection on the ground as far as 7 km on the leeward side. In order to elucidate the stereoscopic mechanism, perpendicular distribution was measured by kytoon and the volume of time-course changes of density were measured by the use of a drum impactor. Collection was performed at equal intervals of 40 m as high as 280 m including the point on the ground. Diffusion was separated into the stable type (August 25th and 27th) and the unstable type (August 26th). On the 25th and 27th, there was an east-northeast wind and the tracer floated on the wind from the Tsurusaki district along the coast toward the center of Oita City. The stability of Pasquill on the 25th was D for the smoke source of 150 m. The stability of Pasquill for the smoke source on the surface of the earth was A or A B. The stability of Pasquill on the 27th was E. There was a wind of 1.1 1.5 m/sec on the 26th and the atmosphere was unstable assuming a neutral layer. The stability of Pasquill was A B.

16735 APTIC NO. 34510

Japan Meteorological Assoc. (Japan)

REPORT ON THE ATMOSPHERIC DIFFUSION IN NEGISHI AREA IN YOKOHAMA CITY. *(Yokohamashi Negishi-chiku taikikakusan chosa hokokusho). Text in Japanese. 90p., March 1968.*

Atmospheric pollution occurred along with the development and expansion of advancing enterprises in Negishi area in Yokohama City. Experiments and estimates were made in the area in order to obtain information for preventive measures including studies of atmospheric diffusion by means of air tracers, an estimate of various weather conditions and atmospheric disturbances, and an estimate of the effective height of smoke stacks. The study period was from July 23rd to 27th, 1967. On the 23rd and 27th, wind was S-S-E and atmospheric strata was stable; but on the 25th and 26th, wind was S-S-W and atmospheric strata was unstable. Fluorescent particles were employed as the tracer and a Rotorod Sampler was used for collection for studying atmospheric diffusion. The smoke origins to release the tracer were set up at the height of 60 m, 90 m and 113 m from the ground. Releasing time was 30 min. The estimation points of the released air tracer were set up at approximately 100 spots on the ground within a sector of an include angle of 114 degrees between the north of the smoke origin and 8 km leeward; estimations of vertical distribution and of the change in process of time were made at 2 spots each. On the 23rd and 27th, since atmospheric strata was stable, the form of diffusion was also stable. On the 25th and 26th, because of unstable weather conditions, the form of diffusion was also unstable. On the 23rd and 27th, at the west end of a high plateau or at the gorge on the west side of the plateau, the concentration was high. On the 26th and 27th, since the tracer spread on the plateau, the geographical influence was quite obvious. Through this experiment, diffusion parameters by height under the same weather conditions were obtained. In estimating the effective height of smoke stacks, the maximum rising rate of exhaust gas from high smoke stacks actually in operation was estimated. The relation was studied between the rising trend of exhaust gas at various diffusing areas and two or three estimation methods for determining the effective height of smoke stacks.

16736 APTIC NO. 34981

Ministry of Health and Welfare (Japan) and Miyagi Prefecture (Japan)

OUTLINE OF THE INVESTIGATIONS ON THE REGIONS UNDER DEVELOPMENT AND CONSOLIDATION: IN RELATION TO THE STUDIES ON AIR DIFFUSION IN SENDAI AND SHIOGAMA DISTRICTS IN MIYAGI PREFECTURE. 1968. *(Showa 44 nendo kaihatsu seibi chiiki to chosa no gaiyo. Miyagiken Sendai Shiogama chiku taiki kakusan chosa kankei). Text in Japanese. 22p., Oct. 1970.*

A tracer experiment was carried out at the regions under development to prevent environmental pollutions. A newly established steam power plant was set as a tracer release-point, and the influence of the tracer to the areas located in the west or north west of the power plant such as Sendai City, Tagajo-machi, Shiogama City, and Rifu-cho was investigated. The latter part of July was chosen when east-southeast or south-southeast winds blew. Ample data for analysis were obtained during five experiments on July 27, 29, and 30. Collected data were analyzed for meteorological conditions including temperature, wind direction, vertical distribution of wind velocity, particularly conditions of inversion layer, vertical range of concentration, stabilization degree, horizontal width of concentration, transferring rate of tracer, and standardized concentration. Since the air layer was stable on July 27 and 29, the concentration of tracer was increased with distance to 1.3 Km from the release point and was not changed beyond there. Under such conditions, a high chimney is so effective that the effect of smoke on the surface of ground was considered to be none, if the height of the chimney was 300 m. On July 30, an inversion layer 100 m high caused high concentrations on the ground. The effect of a high chimney was decreased under such conditions. This effect should be paid much attention from the standpoint of air pollution control.

16737 APTIC NO. 34903

Aitken, John

ON THE NUMBER OF DUST PARTICLES IN THE ATMOSPHERE OF CERTAIN PLACES IN GREAT BRITAIN AND ON THE CONTINENT WITH REMARKS ON THE RELATION BETWEEN THE AMOUNT OF DUST AND METEOROLOGICAL PHENOMENA. PART III. *In: Collected Scientific Papers of John Aitken, LL.D., F.R S. Cargill G. Knott (ed.), Cambridge, Cambridge University Press, 1923, Chapt., 25, p. 363-434.*

Dust observations made in 1891-1893 in Great Britain and on the Continent, using a pocket dust counter, are given, including place, date, and hour of observation, the direction and force of the wind at the time, the temperature and humidity of the air, and the depression of the wet-bulb thermometer. Results indicate that the mean purity of the air from the Atlantic is five times greater than that from the Mediterranean; the Highland air is three times purer, while the air from the Alps is twice as pure.

16738 APTIC NO. 34452

Beals, Gordon A.

GUIDE TO LOCAL DIFFUSION OF AIR POLLUTANTS. *Air Weather Service, Scott AFB, Ill., TR-214, 83p., May 1971. 30 refs.*

NTIS: AD 726984

Information is presented intended to give the field forecaster an appreciation of atmospheric dispersion processes and practical methods for assessing the ability of the air to dilute and carry away contaminants. Global air pollution, area pollution, and local pollution are defined, as well as air pollution limits and the concept of air quality. The physical basis of meteorological variation near the ground is considered. Local temperature structure and local wind structure are discussed. Point sources and line sources of pollution are described, as well as the dependence of diffusion on the temperature gradient. Fanning, fumigation, looping, coning, and lofting are cited. The vaiation of diffusivity with height is indicated, including the effect of variation in the wind direction with height. Diffusion formulae and parameters are presented for concentration estimations. Processes other than turbulent mixing that affect the distribution of toxic material are discussed. The role of the meteorologist in air pollution control is considered. Computational techniques are summarized.

16739 APTIC NO. 34759

Borisov, V. A.

ATTENUATION OF MONOCHROMATIC LIGHT BY SURFACE ATMOSPHERE. *(Oslableniye monokhromaticheskogo izlucheniya prizemnoy atmosferoy). Text in Russian. Opt.-Mekh. Prom., no.7:11-14, 1970. 4 refs.*

The transparency of surface atmospheric strata in a horizontal direction was measured, using lasers as the source of monochromatic radiation. The reduced absorption coefficients were determined for monochromatic radiation 0.488, 0.633, 0.694, 0.844, 1.06, 1.15, 3.51, and 10.6 micrometers. It is shown that in some cases molecular absorption is a main factor determining losses in energy in the atmospheric propagation of laser light, while in other cases light attenuation is caused by scattering. Data on aerosol and molecular scattering are presented which allow determination of the transparency of any horizontal atmospheric path under any meteorological conditions if the absolute atmospheric humidity is known and if visibility is good.

16740 APTIC NO. 34470

Budyko, M. I.

CHANGES OF CLIMATIC CONDITIONS IN THE GEOLOGICAL PAST AND AS AFFECTED BY MAN. *(Lzmeneniya klimata v geologicheskom proshlom i pod vliyaniyem cheloveka). Text in Russian. Vestn. Akad. Nauk SSR, no. 7:60-65, July 1971.*

The alteration of climatic conditions by man started thousands of years ago along with the development of agriculture. The spread of agriculture into wooded areas constituted a factor that contributed to certain climatic alterations on earth. Later, the development of cities constituted an additional factor in the alteration of the climatic condition; these alterations, however, carried a rather microclimatic dimension. The fast growth of industry may severly affect the climatic conditions on earth. According to statistical data, the annual amount of utilized energy on earth during the last decade constitutes an average of approximately 0.02 kcal/sq cm. In densely populated regions provided with high levels of industrial development, this parameter may reach 1.0 kcal/sq cm and even more. Since all used energy is tranformed into heat energy, a supplementary source of heat emerges.

16741 APTIC NO. 34962

Chanourdie, Jean-Claude and Jean-Claude Crestia

CONTRIBUTION TO THE STUDY OF DIFFUSION IN THE TROPOSPHERE OF MINOR CONSTITUENTS. *(Contribution a l etude de la diffusion dans la troposphere des constituants mineurs). Text in French. Paul-Sabatier Univ., Toulouse (France), Faculty of Science, Thesis (Ph.D.), Oct. 26, 1970, 153p. 114 refs.*

NTIS: ND-18609

A diffusion model has been derived in order to study the behavior of various tracers in the troposphere. The natural radioactivity of radon, thoron, and their daughters, as well as the aerosols of sea origin, were the tracers studied. Following an analysis of the various parameters which influence the behavior of these minor constituents, a numerical solution of the diffusion equation is presented for various source geometries in time dependent and independent regimes. (Author abstract modified)

16742 APTIC NO. 34840

Collins, D. G. and M. B. Wells

COMPUTER PROCEDURES FOR CALCULATING TIME DEPENDENT LIGHT SCATTERING IN SPHERICAL-SHELL ATMOSPHERES. (FINAL REPORT). *Radiation Research Associates Inc., Fort Worth, Tex., Defense Atomic Support Agency Contract DAS01-68-C-0169, Proj. NWER XAXH, Task CO62, Work Unit 06, Rept. RRA-T7017-DASA 2640, 135p., April 1971. 20 refs.*

NTIS, DDC: AD 722713

Three Monte Carlo procedures were developed to calculate the transport of visible and infrared light in spherical-shell atmospheres. Designated FLASH, the procedures treat atmospheric scattering problems from plane-parallel, point, volume, and spherical surface sources. The procedures consider the effect of Rayleigh and aerosol scattering and ozone, water vapor, carbon dioxide, and aerosol particle absorption on light transport, plus changes in polarization that occurs at each scattering event. The input formats of the codes allow atmospheric scattering and absorption properties to be described as a function of altitude. Provisions are incorporated for treating the reflection of light from ground and cloud surfaces with an albedo method. The output of FLASH procedures gives the scattered and direct light intensities at each receiver position as a function of a polar and azimuthal angle and time. The codes were written in FORTRAN-IV for the CDC-6600 and IBM Direct Couple systems. They have been verified through comparison with results of other calculations of light transport. Two auxiliary procedures were also developed: MIE-II and SHINE: The former uses Mie theory to generate aerosol particle scattering and absorption coefficients and the four elements of the aerosol phase matric as input data to the FLASH procedures. The SHINE procedure integrates FLASH calculations for point monochromatic sources over an arbitrary wavelength and time-dependent spectrum. (Author abstract modified)

16743 APTIC NO. 35037

Dezso, Szepesi

THE ROLL OF METEOROLOGY IN THE PRESERVATION OF THE CLEANLINESS OF THE ATMOSPHERE. *(A meteorologia szerepe a levegotisztasag vedelmeben). Text in Hungarian. Idojaras (Budapest), vol. 74:513-530, 1970. 20 refs.*

The most important role of meteorology in air pollution control work is the prediction of the frequency and amount of ground level emissions. Inventories of emission sources and a turbulent diffusion model are used on digital computers to provide three dimensional flow and temperature distributions and their variations as a function of time. The model uses a year s observed data. Input data includes the wind profile (based on five years), the stability (based on eight years), and the thickness of the mixing layer. A first approximation of the air pollution model for Budapest was calculated in 1969-1970 using the theoretical and experimental values. Peak values of two to twelve times the allowable norm were found in the inner city of Budapest for sulfur oxides, chlorides, nitrogen oxides, settling dust, and smoke. Predictions regarding the planned expansion of the Danube Thermal Power Station were presented; the influence of different stack geometries were explored. During the next few years, smog predictions will be made for Budapest.

16744 APTIC NO. 34335

Dimitriades, B.

USE OF 14C IN STUDYING POLLUTION OF THE AIR BY PETROLEUM HYDROCARBONS. *Isotop. Radiat. Technol., 9(1):63-64, Fall 1971. 5 refs.*

Component interactions in hydrocarbon mixtures and the extent of carbon monoxide participation in smog formation were studied using C(14) as a tracer. The stoichiometry and kinetics of the nitrogen oxides-sensitized photooxidation of 1-butene for the reactant olefin, both along and in mixture with other hydrocarbons and aldehydes, were determined. The stoichiometric measurements showed a wide variation in the extent of olefin reaction with the nature of the companion reactant. The most striking results were obtained with aldehyde, butene consumption being accelerated by formaldehyde and inhibited by acetaldehyde and proprionaldehyde with no significant effect on stoichiometry. Results of irradiating CO with artificial sunlight in the absence and the presence of other smog-producing compounds -- hydrocarbon and nitrogen oxide mixtures -- showed that CO participates in smog-forming reactions and is oxidized to CO2 at a rate equal to 0.1%/hr of exposure to sunlight. Carbon monoxide lifetime in the atmosphere is thus 0.3/yr.

16745 APTIC NO. 34449

Elterman, L., R. Wexler, and D. T. Chang

FEATURES OF TROPOSPHERIC AND STRATOSPHERIC DUST. *Appl. Opt., 8(5):893-903, May 1969. 41 refs.*

A series of 119 profiles obtained over New Mexico comprise aerosol attenuation coefficients versus altitude to about 35 km. These profiles show the existence of several features. A surface convective dust layer extending up to about five km is seasonally dependent. Also, a turbidity maximum exists below the tropopause. The altitude of an aerosol maximum in the lower stratosphere is located just below that of the minimum temperature. The colder the minimum temperature, the greater the aerosol content of the layer. This relationship suggests that the 20-km dust layer is due to convection in tropical air and advection to higher latitudes. Computer averages of optical thickness show that abatement of stratospheric dust from the Mt. Agung eruption became evident in April 1964. Results based on seventy-nine profiles characterizing volcanic dust abatement indicate that above 26 km, the aerosol scale height averages 3.75 km. Extrapolating with this scale height, tabulations are developed for ultraviolet, visible, and infrared attenuation to 50 km. Optical mixing ratios are used to examine the aerosol concentrations at varous altitudes, including a layer at 26 km having an optical thickness of 0.001 for 0.55-micron wavelength. (Author abstract)

16746 APTIC NO. 34347

Fabian, P., P. G. Pruchniewicz, and A. Zand

TRANSPORT AND EXCHANGE PROCESSES IN THE ATMOSPHERE, AND THEIR DETERMINATION WITH TRACE SUBSTANCES. *(Transport- und Austauschvorgaenge in der Atmosphaere und ihre Erforschung mit Spurenstoffen). Text in German. Naturwissenschaften (Berlin), 58(11):541-549, Nov. 1971. 20 refs.*

Transport processes in the stratosphere and the mass exchange between the stratosphere and troposphere as well as between the two hemispheres were studied with the aid of ozone and strontium 90. For both substances, a worldwide observation network is available. A mass transport of the equatorial ozone source toward higher latitudes was most pronounced in the stratosphere in winter, and least in late summer. Mass transport takes place in an altitude of 15 to 20 kl. Average strontium 90 fallout data and tropospheric ozone data show their highest values at 20-30 degrees, 40 to 45 degrees, and 60 degrees north. A function was computed describing the stratospheric--tropospheric mass exchange. High wind velocities in the boundary layer together with rising air masses in the troposphere prevent an air mass exchange from the stratosphere into the troposphere, while low wind velocities in the boundary layer in connection with sinking air masses promote an exchange. The interhemispheric exchange in the troposphere is governed by a tropical meridion circulation system. For fission products, interhemispheric mixing with a time constant of 3.3 years occurs.

16747 APTIC NO. 34404

Fischer, William H. and G. E. Sturdy

THE CONTRIBUTION OF A CITY TO ATMOSPHERIC TURBIDITY AND THE TURBIDITY BACKGROUND. *Atmos. Environ., 5(7):561-563, 1971. 7 refs.*

Turbidity measurements made with Volz sunphotometers indicate that a small, lightly industrialized city can contribute 1/4 to 2/5 of the total turbidity measured and that a background turbidity does exist. Measurements were made from stations near Boulder, Colorado. (Author abstract modified)

16748 APTIC NO. 34657

Fuquay, J. J. and Ch. L. Simpson

USE OF METEOROLOGICAL MEASUREMENTS FOR PREDICTING DISPERSION FROM RELEASES NEAR GROUND LEVEL. *Pollut. Radioact. Milieux Gazeux, Proc. Symp., Saclay, France, 1963, p. 115-122, 16 refs. (Nov. 12-16.)*

Atmospheric dispersion studies are described as to experimental technique and scope, and the theoretical basis for summarization of exposure data in terms of travel time is reviewed. Results are presented for the decrease of maximum exposure and horizontal plume growth as a function of travel time. Prediction parameters are developed from meteorological measurements of vertical temperature profiles in the boundary layers and the wind speed and direction near release height. The local Richardson Number and the product of the wind speed and standard deviation of wind direction are shown to correlate well with the experimental data. A method is described for predicting exposures from protracted releases in which multimodal, flattened, or skewed distributions are often observed. (Author abstract modified)

16749 APTIC NO. 34494

Gebhart, Reiner

ON THE EQUATORIAL OZONE PROFILE. *Ann. Geophys., 27(2):243-254, 1971. 30 refs.*

The vertical distribution of ozone over the equator is simulated under various model assumptions and compared to latest observational results. Oxygen-hydrogen reactions as well as diffusive and advective transport are incorporated in a time-dependent meridional model. Best agreement with observations is obtained by using 70% of Vincent s mean stratospheric circulation along with a modified version of Prabhakara s pattern of large scale eddy diffusion. The water vapor mixing ratio and Hampson s parameter are indicated. The theoretically calculated total amount of ozone is equal to the observed amount. The height of maximum ozone, however, is predicted too high by approximately three to four km and the computed ozone densities of the upper stratosphere are in excess of the observed ones with maximum deviations of up to 100% in the region around 35 km. (Author abstract modified)

16750 APTIC NO. 34994

Gifford, F. A., Jr., W. M. Culkowski, and W. F. Hilsmeier

COMPUTATION OF ATMOSPHERIC DISPERSION PARAMETERS AT REACTOR SITES BY A SMOKE PLUME RADIO METHOD. *Pollut. Radioact. Milieux Gazeux, Proc. Symp., Saclay, France, 1963, p. 149-153, 16 refs. (Nov. 12-16.)*

A quantitative method for the determination of atmospheric dispersion coefficients involving visual photographic measurements of the ratio of the width to the length of smoke plumes is examined. Based on measurements and diffusion formulas, examples of diffusion parameter determinations at reactor sites are described. The advantages of the system and efficiency are discussed.

16751 APTIC NO. 34630

Gilath, C.

DETERMINATION OF THE DILUTION OF A GAS DISCHARGED INTO A VENTILATED ATMOSPHERE. *Intern. J. Appl. Radiation Isotopes, 22(11):671-675, Nov. 1971. 4 refs.*

A measurement method to determine the dilution factor of a pollutant for any given conditions of ventilation is examined. The theory is based on injecting a pulse of radioactive gas into the flow of the pollutant and counting the activity at any desired point. The method was tested at a bus station and in a test plant on bus exhaust gases at a flow rate of about five cu m/min and dilution in the range of 0.0001-0.00001. (Author abstract modified)

16752 APTIC NO. 34437

Gusev, M. A.

A STUDY OF THE ROLE OF THE MERIDIONAL ATMOSPHERIC CIRCULATION IN THE FORMATION OF THE SPATIAL-TIME REGIME OF OZONE. *(Issledovaniye roli meridionalnoy tsirkulyatsii atmosfery v formirovanii prostranstvenno-vremennogo rezhima ozona). Text in Russian. Izv. Akad. Nauk SSR, Fiz. Atmosfery i Okeana, 7(7):758-765, July 1971. 10 refs.*

An attempt to explain the seasonal variations occurring within the ozonosphere in terms of annual changes occurring in the photochemical phenomena and in the air circulation processes is made. A computer was used to calculate the distribution of ozone within the non-stationary air flow assumed to occur between 2.5 and 37.5 km altitude. Both the vertical and horizontal meridian circulation rate components vary periodically during the year. Straight meridian circulation with ascendent air currents occurring above 45 N latitude and with descendent air currents occurring below this latitude is considered to start at mid-fall. The horizontal component of the air current speed vector is directed towards the north above a 20 km altitude and it is directed towards the south below this altitude. This circulation pattern reaches its peak values in midwinter, it decreases towards the spring, and it appears to be extinguished in mid-spring. An inverse meridian circulation with ascendent air flows above 45 northern latitude and descendent flows below this latitude starts mid spring. This circulation pattern reaches its peak value in midsummer. The computed values for the spacial ozone distribution by season and high, moderate, or low latitudes are presented graphically. The theoretically computed values appear to be somewhat higher than the empirical data indicating that more interfering factors should be taken into consideration in the computation of ozone distribution variations.

16753 APTIC NO. 34369

Halpern, Paul, Conrad Simon, and Larry Randall

SOURCE EMISSIONS AND THE VERTICALLY INTEGRATED MASS FLUX OF SULFUR DIOXIDE ACROSS THE NEW YORK CITY AREA. *J. Appl. Meteorol., 10(4):715-724, Aug. 1971. 10 refs.*

Sulfur dioxide concentrations (in ambient air), obtained from helicopter soundings and traverses, together with wind data from pibals, were used in a kinematic box model to determine hourly average three-dimensional fluxes of SO2 in the New York City area. Continuous dry-bulb temperature and pressure height records were obtained concurrently and utilized in the analysis and interpretation of the flux data. The SO2 fluxes were compared to degree-day-dependent emissions from residential, industrial, and utility sources. Results indicate that the vertical structure of the fluxes is related to diurnal variations of temperature lapse rates. Furthermore, emission rates determined from the measurement of flux in 13 tests agree with those derived from the New York City sulfur dioxide emission inventory within limits acceptable for use in air pollution modeling. (Author abstract modified)

16754 APTIC NO. 34323

Hampl, V., M. Kerker, D. D. Cooke, and E. Matijevic

SCAVENGING OF AEROSOL PARTICLES BY A FALLING WATER DROPLET. *J. Atmospheric Sci., 28(7):1211-1221, Oct. 1971. 39 refs.*

The collection efficiency was studied of water droplets (0.71-2.54 mm radius) freely falling through a silver chloride aerosol consisting of a relatively uniform distribution of spheres with radii in the range of several tenths of a micron. The droplets accelerated for a distance of 30 cm prior to entering the 130-cm aerosol chamber. The particle size distribution of the aerosol was determined by light scattering, and the amount of AgCl scavenged by the droplet was analyzed by a very sensitive colorimetric method. Measured collection efficiences were extremely low, dropping off sharply from a value of 0.0003 for a 2.54-mm droplet to a minimum of 0.000007 for a 0.94-mm droplet; they appear to rise again for smaller droplets. There was no evidence of any significant trends with a particle radius which ranged from 0.2-0.5 micron. For the three smallest droplets the data correlate well with the Peclet number, suggesting that the mechanism of collection is Brownian diffusion through the streamlines. The mechanisms for larger droplets may involve eddies in the wake of the droplet with enhanced collection on the backside. (Author abstract modified)

16755 APTIC NO. 34834

Hanna, Steven R. and S. D. Swisher

AIR POLLUTION METEOROLOGY OF THE ROCKWOOD-HARRIMAN, TENNESSEE, VALLEY. *National Oceanic and Atmospheric Administration, Oak Ridge, Tenn., Air Resources Atmospheric Turbulence and Diffusion Lab., Rept. NOAA-71040730, 4326000/21C530230, 24p., Dec. 1970. 11 refs.*

NTIS: COM-71-00575

Domestic and industrial heating and emissions from a single, large, low-level industrial source are approximately equally responsible for the high concentrations of suspended particles observed in the Rockwood-Harriman industrial corridor at times of poor atmospheric dilution. The air in the industrial corridor cannot support any additional air polluting industries unless coal is discouraged as a means of residential and industrial space heating and corrective measures are taken to reduce emissions from the large industrial source. Wind speed and direction, suspended particulate concentrations, and a comparison of wind and concentration data are included. Concentrations due to emissions from the Roane Electric Company, the Kingston steam plant, and industrial and residential space heating are calculated. (Author abstract modified)

16756 APTIC NO. 34930

Holzworth, George C.

AIR POLLUTION CLIMATOLOGY. *Preprint, American Inst. of Chemical Engineers, New York, 29p., 1971. 20 refs. (Presented at the American Institute of Chemical En-*

gineers, Annual Meeting, 64th, San Francisco, Calif., Nov. 28-Dec. 2, 1971.)

Transport and diffusion of air pollutants in urban areas is accomplished by atmospheric motion scales that depend variously upon large or synoptic scalyand mesoscale meteorological features. These features are more or less influenced by the roughness elements and thermal properties of cities themselves. Low-level temperature inversions at night are the rule in the United States rather than the exception. In the daytime the annual average height of relatively vigorous vertical mixing is estimated to range from 2600 meters over the southern Rockies to about 800 meters along the California Coast; comparatively low values occur near major shorelines. Based on morning mixing height and wind speed data, the isopleth pattern of annual upper decile theoretical normalized concentrations for large cities vary in the United States by a factor of nine. The distribution of stagnation episodes and plume behavior are also discussed.

16757 APTIC NO. 34736

Jennings, R. E. and A. F. M. Moorwood

ATMOSPHERIC EMISSION MEASUREMENTS WITH A BALLOON-BORNE MICHELSON INTERFEROMETER. *Appl. Opt., 10(10):2311-2318, Oct. 1971. 14 refs.*

A balloon-borne spectrometer was used to measure thermal radiation in the atmosphere as a function of height. The Michelson interferometer is described and complete operating procedures, including calibration and data reduction, are outlined. Data on initial spectra in the range 100-1000/cm (10-100 micron) obtained to a mean resolution of 34/cm during flight are presented. Considerable emission was still present at aircraft altitudes, and even at 38 km, radiation was still received from the 15-micron carbon dioxide band. (Author abstract modified)

16758 APTIC NO. 34979

Kasahara, Mikio and Kanji Takahashi

AEROSOL FORMATION FROM PHOTOCHEMICAL OXIDATION OF SULFUR DIOXIDE -- REVIEW (I). *(SO2 no kokagakuteki sanka ni yoru earozoru seisei ni kansuru kenkyu genjo to mondaiten (sono ichi)). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 7(11):13-17, Nov. 1971.*

Sulfur dioxide in the air absorbs solar radiation of 2900-4000 A and reaches a state of excitation without decomposing, because 135 kcal energy is required for decomposition of one SO2 molecule, while only 85-95 kcal per molecule energy is supplied by the sun. Therefore, the first step in photochemical reaction may be considered to be the excitation of SO2. Close to 99% of ultraviolet ray absorbed by SO2 is believed to be used for excitation, and part of the excited SO2 particles collide with other particles and return to the ground state. The rest is oxidized and turned into sulfur trioxide. But the mechanism of photochemical reaction has not been satisfactorily explained. Among many theories and data that have been published, the photochemical oxidation speed obtained from the Zo-o Mining Refinery area in Japan was 0.12 k/min and was much faster than other figures that have been previously published. The reason might be the much larger portion of wave lengths of range less than 3200 A at the Zo-o mountain, compared to the amount of the rays of the same intensity in cities, plus the fact that SO2 ultraviolet absorption peaked near 2950 A at Zo-o. Various other studies concerning experiments of SO2 reaction to the sunlight, relationships between photochemical reactions and humidity, SO2 concentration, nitrogen dioxide, hydrocarbon, the time element, the wavelength of light, are reviewed. Various published data are summarized in a table form.

16759 APTIC NO. 34897

Kleinsasser, T. W. and R. C. Wanta

THE DEVELOPMENT OF A FORECASTING SERVICE FOR USE IN AIR-POLLUTION CONTROL. *A.M.A. Arch. Ind. Health, vol. 14:307-318, Oct. 1956. 10 refs. (Presented at the Air Pollution Control Association, Annual Meeting, Buffalo, N. Y., 1956.)*

A stagnation forecasting service was developed to prevent abnormal concentrations of waste gases, including sulfur dioxide, in the vicinity of the Tennessee Valley Authority Kingston power plant. Prolonged stagnant periods are predicted on the basis of the large-scale general circulation. Such periods of stagnation in the East Tennessee area are characterized by the presence of an intense low-pressure system over the Western or Central Atlantic at middle latitudes. The eastward movement of the system must be blocked in turn by a very extensive anticyclone to the east and/or north. This type of blocking high precedes the development of a stagnant anticyclone over the Eastern United States by several days. Three types of stagnation warnings are issued: stagnation trend advisories, stagnation alerts, and extreme local stagnation warnings. Both the trend advisories and alerts are based on the general circulation over the Northern Hemisphere, with the alert issued after a polar anticyclone has begun to settle over the Appalachians. An extreme alert is given when local meteorological conditions necessary to abnormal pollutant concentrations are prevalent and expected to persist, e.g., prolonged periods of low wind speed and a negative temperature difference exceeding one F between Kingston and Knoxville. The extreme local warnings are the basis for modifying plant operation in the interest of pollution control.

16760 APTIC NO. 34912

Koczkur, E. and W. J. Moroz

PLUME RISE AND DISPERSION IN A LOCAL WIND SYSTEM. *Preprint, American Society of Mechanical Engineers, New York, 7p., 1970. 12 refs. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, New York, Nov. 29-Dec. 3, 1970, Paper 70-WA-Fu-1.)*

Plume rise and dispersion under atmospheric conditions conducive to the development of local thermal circulations such as a sea or lake breeze are of special interest, because the plume is brought over land unless it attains a final height of 1500 to 2500 ft above ground. The behavior of plumes from a thermal generating station near Lake Ontario was studied through photographic techniques and a mathematical model for diffusion in a sea or lake breeze was developed. Approximately 14 min after leaving the stack, the plume centerline approached an asympototic height of 750 ft above the level of release in a horizontal travel distance of 0.6 mi. Over the observed period to travel, the rate of dispersion in the vertical, as indicated by standard deviations of plume depth about the mean centerline, was considerably less than would be predicted in a near neutral atmosphere using surface winds at an inland station. The difference may, in part, be accounted for by the differing wind speeds at surface and aloft; by the large initial size of the plume; and by the reduced frequency and amplitude of atmospheric eddies that move the entire plume in space. Dispersion values predicted by the mathematical model are in good agreement with observations of vertical spread from a buoyant plume in a profile of decreasing wind velocity with height above the surface and near uniform sheer. The model allows for the inclusion of an inital speed and predicts the rate if increase of spread with downwind distance from the real source rather than from an effective source in space. As such, it realistically describes actual vertical effluent distribution in space.

16761 *APTIC NO. 34343*

Kondratyev, K. Ya.

SPECTROPHOTOMETRY OF THE ENVIRONMENT FROM SPACE. Naturwissenschaften (Berlin), 58(11):529-541, Nov. 1971. 20 refs.

In the Soyuz-5 space mission, the terrestrial atmosphere twilight glow was measured over the wavelengths 400 to 650 micron by spectrophotometry in addition to corresponding visual observations. A hand spectrograph was especially designed for the purpose. The visual observations comprised the estimation of the vertical brightness evolution and the twilight aureole color, with the sun emerging above the horizon. The analysis of the brightness curves obtained suggests that there are no marked brightness depressions due to aerosol layers localized at different atmospheric levels (such as 11 and 19 km). Calculations were made to determine the influence of the aerosol concentration in the layers and the solar depression angle on the absolute values of the depressions concerned and on the color picture of the aureole measured. The double increase in the aerosol volume concentration at the altitude of 20 km did not cause noticeable depression in the corresponding brightness curve; these appeared only when the aerosol volume concentration at this altitude was increased by a factor of 4. The conventional value of the aerosol volume concentration given by the Elterman model caused depressions on the monochromatic brightness curves only at a solar depression angle in excess of three degrees. From the analysis of the calculated colorimetric data as derived for the Elterman model, one can conclude that at a small solar depression angle the twilight sky color is substantially influenced by ozone. The brightness depression due to the aerosol layer occurs with large solar depression angles and will be perceived by the observer from space as dark bands of decreased brightness.

16762 APTIC NO. 34637

Kuppu Rao, V.

THE BUOYANT PLUME ABOVE A HEAT SOURCE. *Atmos. Environ., 4(5):557-575, Sept. 1970. 8 refs.*

The boundary-layer type conservation equations of mass, momentum, and energy for the steady free turbulent flow in gravitational convection over heat sources are set up for both two-dimensional and axisymmetric cases. These are reduced to ordinary differential equations in a similarity parameter by suitable transformations. The three classical hypotheses of turbulent diffusion -- the Constant Exchange Coefficient hypothesis, Prandtl s Momentum Transfer theory, and Taylor s Vorticity Transfer theory -- are then incorporated into these equations in succession. The resulting equations are solved numerically and the results compared with some previously reported experimental results on gravitational convection over heat sources. (Author abstract modified)

16763 APTIC NO. 34953

Lile, Robert C.

TETROON-DERIVED EDDY VISCOSITY IN THE REGION OF THE ELEVATED WEST COAST TEMPERATURE INVERSION. *San Jose State Coll., Calif., Dept. of Meteorology, National Science Foundation Grant GA-1075, Rept. 1, 36p., July 20, 1970. 12 refs.*

During the summer of 1967, sixty constant volume balloons (tetroons) were flown and radar tracked within the boundary layer of the San Francisco Bay Region. By ballasting the tetroons to fly at various altitudes, an estimate of the vertical distribution of tetroon-derived Reynolds stress was obtained. Free-lift balloons provided estimates of the vertical wind shear. The averaged vertical distribution of tetroon-derived Reynolds stress (an approximately linear increase with height) indicates a mean vertical convergence of horizontal momentum toward the center of the west coast temperature inversion layer. Typically, a broad wind jet was present with its maximum in the upper central region of the inversion layer. This apparent mean countergradient flux of momentum into the jet suggests the presence of negative eddy viscosity effects above the inversion base. Additional and more reliable data are necessary to confirm the existance of these effects and their possible role in the creation and maintenance of the wind jet. (Author abstract modified)

16764 APTIC NO. 34911

ACOUSTIC SOUNDING OF THE LOWER ATMOSPHERE. *Meteorol. Monogr., 11(3):397-404, Oct. 1970. 20 refs.*

The refractive index of air to sound waves is a function of the three primary meteorologic parameters of the lower atmosphere, i.e. wind, temperature, and humidity. The use of propagation of sound waves to derive quantitative information on these atmospheric parameters by remote sensing is considered and the system parameters required to achieve an effective acoustic sounder are discussed. Acoustic sounding techniques could be developed to monitor (to heights of at least 1500 m) the vertical profiles of wind speed, wind, direction, and humidity; the location and intensity of temperature inversions; and the three-dimensional spectrums of mechanical turbulence and temperature inhomogeneity (optical refractive index fluctuation). Time and height resolutions, spatial wave number, and limitations of the technique are reviewed. Among the potential applications is study of the meteorologic aspects of air pollution. (Author abstract modified)

16765 APTIC NO. 34973

Low, Richard D. H.

A COMPREHENSIVE REPORT ON NINETEEN CONDENSATION NUCLEI. (PART II). *White Sands Missile Range, N. Mex., Atmospheric Sciences Lab., Army Electronics Command DA Task Force 1T061102B53A-20, TR-ECOM-5358, OSD-1366, 260p., Jan. 1971. 281 refs.*

NTIS, DDS: AD 7215910

A new expression for the growth rate of a single rate of a single isolated solution droplet in a stationary medium of humid air is presented, which takes into account the hygroscopicity of a condensation nucleus in terms of a single parameter in consonance with the modern practice of physical chemistry and which includes an explicit term to reflect the inefficiency of the condensation process. The expression is then programmed to compute the growth times of 19 important condensation nuclei in seven different sizes under six assumed supersaturations. Part I of this report had dealt with equilibrium droplet radii versus saturation at 20 C and one atmosphere. (Author conclusions modified)

16766 APTIC NO. 34968

Lukey, Michael E.

TESTS OF WIND TUNNEL AND MATHEMATICAL AIR POLLUTION MODELS IN A ROUGH TERRAIN SITUATION. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 91p., 1969. 27 refs. (Presented at the Air Pollution Control Association Annual Meeting, 63rd, St. Louis, Mo., June 14-18, 1970, Paper 70-17.)*

The validity of present diffusion models for predicting sulfur dioxide concentrations near a large emission source (power station) in rough terrain was determined based on plant operating characteristics, S02 concentration, and meteorological factors. The New York University wind tunnel model to predict the dispersion of effluents from two stacks of the proposed plant was examined. Wind speed and direction, sampling distance, stack height, plant load, gas exit velocity and temperature, turbulence index, solar radiation, cloud formations, altitudes, and plume behavior were important factors for correlation with S02 diffusion and topographic interactions. The Gifford and Gifford Turner mathematical models did not provide suitable predictions in the higher concentrations; 50% of the 1969 data was within 0.10 ppm of the mathematical predictions. The wind tunnel study predicted zero concentrations at speeds below 7.4 miles/hour; however, several high readings at such wind speeds with the same wind direction were obtained. The data determined significant S02 even higher than 0.20 ppm from the power plant in the summer. The models were therefore proven unsuitable for narrow predictions of S02 concentrations in the area.

16767 APTIC NO. 34751

Lyapina, O. A., Yu. N. Ogol, and N. N. Romanov

ATMOSPHERIC TURBIDITY AT THE FOOT-HILLS AND IN THE MOUNTAINS OF THE WESTERN EXTENSION OF TIEN SHAN ACCORDING TO HELICOPTER OBSERVATIONS. *(Atmosfernyye zamutneniya po nablyudeniyam s vertoletr v predgoryakh i gorakh zapadnykh otrogov tyan-shanya). Text in Russian. Tr. Gl. Geofiz. Observ. (Leningrad), no. 189:154-159, 1966. 8 refs.*

The dusty haze above the river network of the western Tien Shan at altitudes ranging between 100 and 1500 m and 1500 and 3000 m was explored by means of 17 helicopter expeditions performed during the July and August months of 1964. The haze distribution over the investigated region was graphically illustrated. The most intense turbidity was observed over the city of Tashkent. This turbidity was referred to as the aerosol lens because of its specific shape. The natural origin of this haze appeared to be combined with the industrial aerosols produced in the urban area of Tashkent. Local transfer of haze due to mountain and valley air currents were seen. The Northern and North-Western regions of the valley were less dusty than those of the South or South-Western regions. Both local and incoming haze stagnated within the lower 2-3 km altitude above the Fergana Valley due to the weakness of summer winds.

16768 APTIC NO. 34636

Macey, H. H.

BOSANQUET S PLUME RISE FORMULA AND THE T.V.A. DATA. *Atmos. Environ., 4(5):577-583, Sept. 1970. 3 refs.*

The Tennessee Valley Authority s observations of plume rise from large power stations are compared with values calculated with the well known Bosanquet formula. Good agreement is found for single stacks at wind speeds above about four m/sec or five m/sec, but at low wind speeds the calculated values are too high. The same conclusion is reached with twin stacks when their emissions are combined and treated as one. Agreement over the whole range of wind speeds is definitely improved by using a value of 150 sec instead of the conventional value of 200 sec for the factor t-sub one in the Bosanquet formula. The use of the figure 150 sec reduces the plume rise and consequently increases the calculated height of a chimney. From the point of view of industry, the decision is financially an important one. (Author abstract modified)

16769 APTIC NO. 34900

Mitchell, J. Murray, Jr.

THE EFFECT OF ATMOSPHERIC AEROSOL ON CLIMATE WITH SPECIAL REFERENCE TO SURFACE TEMPERATURE. *National Oceanic and Atmospheric Administration, Silver Spring, Md., Environmental Data Service, NOAA TM-EDS 18, 28p., Nov. 1970. 24 refs.*

NTIS: COM 71 00341

A generalized model of the effect of a thin atmospheric aerosol on the terrestrial heat budget was developed and applied to the problem of estimating aerosol impact on surface temperature. The study showed that the aerosol effect may be one of warming or cooling, depending on various properties of both aerosol and underlying surface. In principle, the distinction between warming and cooling can be determined for real aerosols by comparing the observed aerosol absorption-to-backscatter ratio with the criticial absorption-to-backscatter ratio, for which an equation was derived. In practice, this determination is problematical because none of the important aerosol parameters has been measured in the field, except in rare instances. Existing estimates of absorption-to-backscatter ratios for tropospheric aerosols are an order to magnitude of more larger than the critical absorption-to-backscatter ratios derived in this paper. This suggests that, apart from arid regions and (on a local scale) urban areas, the predominant effect of tropospheric aerosol on surface climate is likely to be one of warming rather than cooling. In arid and urban areas, the effect should be marginal between warming and cooling. Suggestions that apparent worldwide cooling of climate is attributable to large-scale increases in particulate pollution of the atmosphere by human activities are not supported by this analysis.

16770 APTIC NO. 34770

Murcray, D. G. and D. B. Barker

BALLOON-BORNE HUMIDITY AND AEROSOL SENSORS. *Denver Univ., Colo., Physics Dept., National Aeronautics and Space Administration Contract NAS8-30179, Rept. NASA CR-61339, 42p., Feb. 16, 1971. 104 refs.*

NTIS: N71-18950

A state-of-the-art survey of humidity and aerosol sensors was conducted that emphasized techniques and instruments that could possibly be used with nonrecoverable rawinsonde balloon-type packages to explore the first 20 km of the atmosphere. Theoretical and experimental analyses established the feasibility of sensing humidity through infrared emission, techniques based on sorption, frost point, radiant absorption and emission, and mass flow are also discussed. No instruments for aerosol sensing applicable to rawinsonde-type measurements are currently available. Developmental or prototype devices which show some potential are categorized according to the measurement principle involved (optical scattering, electrostatic, acoustic, mass, and impact). The cost and complexity of a balloon-borne aerosol detector appears to vary at least linearly, but probably with the degree of particle characterization desired. The simplest and least expensive unit would respond to total or time-integrated mass collected. A more elaborate unit could also give a particle count. Still more complex optical scattering devices could add an indication of particle size although more study is needed on the effects of particle shape and refractive index.

16771 APTIC NO. 34967

Nguyen, Ba Cuong

STUDY OF THE EXCHANGES BETWEEN THE VARIOUS ZONES OF THE ATMOSPHERE ABOVE THE CONTINENTS AND THE OCEANS BY MEANS OF RADIOACTIVE TRACERS. *(Etude par les traceurs radioactifs des echanges entre les diverses zones de l atmosphere au-dessus des continents et des oceans). Text in French. Paris Univ. (France), Faculty des Sciences, Thesis (Ph.D.), Paris, France, Jan. 1971, 173p., 143 refs.*

NTIS: CEA-R-3977

The varying conditions of radioactivity in the atmosphere above the continents and above the oceans, originating from fallout after thermonuclear explosions, are discussed. Numerous measurements were made, using special filters for absorption of aerosols whose radioactivity was measured by radiation tests. Strontium(90) and cesium(137) are the elements mostly tabulated in this study. The intensity of radioactivity over the oceans 1.25 to 1.50 times greater than that over the continents. The border between the troposphere and the stratosphere, called the tropopause, is characterized by a practically constant temperature of -55 C, and ranges between 6 and 17 km above the earth. The tropopause rises seasonably toward the end of the winter and in spring, leaving radioactive debris in the troposphere. A significant cause for the transport of radioactive aerosols from the stratosphere to the troposphere are the so-called jet streams which are currents flowing from east to west at speeds of 100 to 300 km/hr, which break through the tropopause. Rain can also contribute to the transport of radio-active fallout. Travel of fallout from the stratosphere via the troposphere to ground level may take about three months. Radioactivity measured in one location showed considerable fluctuations in a single day, varying between maximum and minimum values with a ratio of 30 to 1. Acute strong fallout usually limited to an area of 300 to 400 km in diameter. The fission products of the thermonuclear bomb exploded in China in June 1967 appeared in France for the first time about six weeks after the explosion, which indicates that these products were injected into the atmosphere at a high altitude.

16772 APTIC NO. 34792

Niemeyer, L. E., R. A. McCormick, and J. H. Ludwig

ENVIRONMENTAL ASPECTS OF POWER PLANTS. *International Atomic Energy Agency, Vienna (Austria), and Atomic Energy Commission, Washington, D. C., Symp. Environ. Aspects Nucl. Power Stations, New York, 1970, p. 711-722. 25 refs. (Aug. 10-14, Paper 146/42.)*

Emissions of sulfur oxides from coal- and oil-fired electric generating plants are second only to emissions of pollutants from internal combustion engines in degrading the atmospheric environment of the United States. Anticipating a threefold growth of electric power production in the USA over the next 30 years, the National Air Pollution Control Administration has initiated a comprehensive program to deal with the environmental aspects of power plant effluents. Dispersion of effluents from tall stacks is discussed, as well as the problem arising from the escape of large quantities of water vapor from cooling towers. The transformation of sulfur compounds in power plant plumes is considered, and the removal of pollutants by natural atmospheric cleansing processes is discussed. Power plant siting is also mentioned. (Author abstract modified)

16773 APTIC NO. 34965

Olsson, Lars E. and Wesley L. Tuft

A STUDY OF THE NATURAL VENTILATION ON THE COLUMBIA-WILLAMETTE VALLEYS. *Oregon State Univ., Corvallis, Dept. of Atmospheric Sciences and Oregon State Univ., Corvallis, Air Resources Center, TR-70-6, 175p. June 1970. 28 refs.*

Prolonged periods of atmospheric stagnation over western Oregon lead to a greatly reduced atmospheric dispersion of air pollution in the valleys along the Columbia and Willamette Rivers. Prior to developing a dispersion model for use in an abatement program, an investigation was made of the natural ventilation of the Portland area – located where the Willamette River joins the Columbia River. Extensive measurements of stability and wind regimes were taken on 10 days between July 30, 1969 and May 4, 1970. Major emphasis was placed on days when atmospheric stagnation was predicted and poor natural ventilation was expected. The results show that winds and transport trajectories within the mixing layer are influenced in a complex way by local topography and surface characteristics and are at times completely decoupled from the general flow aloft. Strong wind speed and direction shears are frequent over the region; but it appears possible to establish correlations between the winds within the mixing layer and the surface winds at several specific locations in the area. There are good correlations between the stability regime, the wind regime, and specific synoptic conditions. The most important meteorological parameters to be included in a numerical dispersion model are mixing height and transport trajectories. Thus, the models being developed for the Portland area are based on the box model concept, where lateral boundaries are defined by topographic features and vertical boundaries by mixing height. The dispersion is determined by atmospheric transport rather than by turbulent diffusion.

16774 APTIC NO. 34361

Pasquill, F.

ATMOSPHERIC DISPERSION OF POLLUTION. *Quart J. Roy. Meteorol. Soc. (London), 97(414):369-395, Oct. 1971. 40 refs.*

Features of theory, observation, and procedure in the estimation of the dispersive action of the atmosphere are surveyed. Included is a summary of the basis and history of idealized dispersion formulae plus indications of the performance of particular versions which are currently most useful. Special attention is given to the behavior of effluent plumes from modern power stations, the local distribution of pollution from an urban-industrial complex, and the transport and distribution of pollution on a national or regional scale. The need of unequivocal observational estimates of final rise of power-station plumes is stressed, as are two factors that should be considered in mathematical modeling of pollutant dispersion from multiple sources. These are the relative importance of individual sources in a multiple array and clarification of the reasons why puff analyses may be superior to procedures assuming quasi-steady releases. The lifetime of sulfur dioxide in the atmosphere must also be determined. Significant progress will depended on aerial sampling, studies of the lowest 10 m or so of the vertical sulfur dioxide profile with the object of obtaining supporting estimates of the loss by deposition, and addition of special ground sampling stations downwind of and remote from major source areas.

16775 APTIC NO. 34382

Pearson, F. J., Jr. and Donald W. Fisher

CHEMICAL COMPOSITION OF ATMOSPHERIC PRECIPITATION IN THE NORTHEASTERN UNITED STATES. *Geological Survey, Washington, D. C., Water Supply Paper 1535-P, 23p., 1971. 17 refs.*

Monthly bulk precipitation samples were collected from 18 sites in New York, Pennsylvania, and New England during periods that lasted from 12 to 36 months. The samples were then analyzed for calcium, magnesium, sodium, potassium, ammonium, hydrogen ion, bicarbonate, sulfate, chloride, nitrate, and phosphate. Analytical results were combined with precipitation amounts to get annual average loads of the various ionic species as thousandths of a ton per day per square mile. Atmospheric precipitation in the Northeastern United States is composed of a dilute calcium-hydrogen sulfate water having additional sodium and chloride near the coast. In the inland and coastal sections, excepting only the highly industrialized areas, variations amon the precipitation chemical loads measured at various sites show no systematic differences that suggest sectional changes in precipitation chemistry. In the rural inland section, the average loads of all measured constituents except sulfate and hydrogen ion are independent of precipitation amount. In the coastal section, sodium and chloride loads vary with precipitation, presumably owing to the effects of sea spray. Limited data show that industrial regions are marked by the presence of higher calcium, sulfate, and nitrate loads. 0Atmospheric precipitation contributes substantially to the chemical load of streams. (Author abstract modified)

16776 APTIC NO. 34932

Peterson, James T.

THE APPLICATION OF METEOROLOGY TO LAND USE PLANNING AND INDUSTRIAL SITING. *Air Pollution Control Office, Research Triangle Park, N. C., Div. of Meteorology, 7p., 1971 (?).*

Applying meteorology and climatology to problems involving land use, city planning, and industrial siting can often lead to direct economic, practical, and environmental benefits. Climatological advice can help determine the course of land development by considering such factors as the influence of industrial air pollutant emissions and the possibility of increasing recreational facilities. Metropolitan areas modify several components of their climate from that which existed naturally. The most significant feature of urban climates is the increased warmth, or heat island, which is most pronounced during nighttime when anticyclonic weather prevails. In addition, precipitation may be slightly increased over urban areas whereas solar radiation and visibility may be reduced because of the greater pollutant concentrations. One beneficial type of urban land-use is the maintenance of park or green areas. Certain topographical features can alter general meteorological conditions and thereby affect pollutant dispersion.

16777 APTIC NO. 34624

Pich, J., S. K. Friedlander, and F. S. Lai

THE SELF-PRESERVING PARTICLE SIZE DISTRIBUTION FOR COAGULATION BY BROWNIAN MOTION -- III. SMOLUCHOWSKI COAGULATION AND SIMULTANEOUS MAXWELLIAN CONDENSATION. *Aerosol sci., 1(2):115-126, May 1970. 21 refs. (Presented at the International Colloquium on Atmospheric Pollution, Paris, France, Nov. 27-28, 1969.)*

A theoretical study was made of the dynamics of coagulation with simultaneous condensation and of the behavior of the particle size distribution function. For coagulation and condensation in the continuum region the existence of self-preserving spectra depends a nondimensional parameter C, which depends on the viscosity and temperature of the medium, Boltzmann s constant, the total volume concentration, the total number concentration of particles, the condensation rate, and the supersaturation. Phase equilibrium exists for C equal to O, while simultaneous condensation and coagulation occur for C greater than 0. For C equal to 1.09, the total surface concentration (surface area of particles per unit volume of gas) is invariant with respect to time. For other values of C, the supersaturation must vary with time in a particular way in order for the system to be self-preserving. The shapes of the self-preserving spectra are strongly dependent on C. Analytical solutions of the transformed kinetic equation have been found for the lower and upper ends of the spectrum, and numerical solutions for the entire spectrum have been calculated for four values of C. The theory is limited to values of C smaller than unity. (Author abstract modified)

16778 APTIC NO. 34531

Plank, Vernon G., Alfred A. Spatola, and James R. Hicks

SUMMARY RESULTS OF THE LEWISBURG FOG CLEARING PROGRAM. *J. Appl. Meteorol., 10(4):763-779, Aug. 1971. 8 refs.*

Results of helicopter clearing experiments conducted at the Greenbrier Valley Airport, Lewisburg, West Virginia, during the period September 7-29, 1969, are presented and discussed. Thirty-five hover experiments and eighteen runway-clearing experiments were performed on 10 separate days with fog layers from 125 to 525 ft in depth. The hover experiments, which were successful in virtually all cases, yielded clearings that varied from 400 to 2800 ft in length. The largest clearings occurred with the shallowest fog during tests conducted within approximately one hour of the natural dissipation time of the fog. The runway-clearing experiments were successful in clearing the full 6000 ft extent of the runway on two occasions, were partially successful on four occasions, and were unsuccessful on 12 occasions. Six helicopter landings were accomplished through artificially created clearings. The wake penetration distance of the helicopters ranged from approximately 700 to 1000 ft, and the steady-state clearing times varied from approximately 150 to 260 sec. The total entrainment (mixing) of environmental air into the wake air during the steady-state period was between 350 and 1000%. The clearing ratios, the ratios of cleared volume to down-transported volume, had values of 1.8 to 8.7. (Author abstract modified)

16779 APTIC NO. 34306

Priestley, C. H. B.

THE GLOBAL ATMOSPHERE: A MEMORIAL TO H. C. RUSSELL. *Search, 2(8):273-279, Aug. 1971.*

The contributions of Henry Chamberlain Russell, who helped start a number of meteorological observing stations in New South Wales and who published a daily weather map are detailed. He believed the movement of the anticyclones of this region was a hemispheric phenomena. The two hemispheres are different, in the north, anticyclon0es are typically quasi-stationary circulation systems. A systematic study of 34 years of charts was made to obtain the typical tracks of anticyclonic centers across Australia, as a function of season. The amplitude of the annual north-south swing of the tracks varied with the 11-year period of the sunspot cycle. The speed of travel of the anticyclonic centers yields an average interval of 6.8 days between successive centers; thus the apparent tendency for sequences of wet or fine week-ends in southern Australia is no illusion. During last twelve years, the charts have been revised, and a greater interest in large-scale numerical-dynamic models has occurred. One concerted international effort has been the establishment of a worldwide network of stations measuring stratospheric ozone. The influence of pollution on atmospheric carbon dioxide levels is also being studied.

16780 APTIC NO. 34734

Quinio, R. Le and J. Hugon

INSTRUMENTS AND METHODS FOR MEASURING ATMOSPHERIC DIFFUSION. *(Appareils et methodes pour la mesure de la diffusion atmospherique). Text in French. Pollut. Radioact. Milieux Gazeux Proc. Symp., Saclay, France, 1963, p. 175-178. 1 ref. (Nov. 12-16.)*

A measurement method for the determination of atmospheric diffusion is examined with respect to instrumentation, tracers, spectral determination of emissions, operating procedures, and meteorological parameters. Approximately one hundred experiments were conducted on deposition and in-air concentration measurements under diverse conditions of wind speed and direction, temperature, humidity, precipitation, and thermal gradients.)

16781 APTIC NO. 34567

Ramsdell, J. V., Jr. and W. T. Hinds

CONCENTRATION FLUCTUATIONS AND PEAK-TO-MEAN CONCENTRATION RATIOS IN PLUMES FROM A GROUND-LEVEL CONTINUOUS POINT SOURCE. *Atmos. Environ., 5(7):483-495, 1971. 17 refs.*

Diffusion data collected by 63 incremental samplers during four short duration, continuous releases of krypton-85 are used to examine concentration fluctuations and peak-to-mean concentration ratios in the atmosphere. Cumulative frequency distributions and the intensity of short-term concentrations are shown to be a function of the relative crosswind position within the mean plume. Peak-to-mean concentration ratios are shown as a function of relative crosswind position within the plume and the ratio of the durations of the mean and the peak. The relationship between the intensity of concentration fluctuations and the relative crosswind position is similar to that reported for laboratory data. The relationship between peak-to-mean ratios and the time-ratio differed from the simple power law relationship suggested by several workers. Previous estimates of the peak-to-mean/time ratio relationship for positions near the mean plume axis are shown to be too low. (Author abstract)

16782 APTIC NO. 34934

Reuter, H.

ON THE INFLUENCE OF METEOROLOGICAL PARAMETERS ON THE LOCATION OF THE MAXIMUM EMISSION SOURCE. *Bioklimatol., Ser. A., vol.*

14:55-68, 1964. 4 refs. Translated from German by Scientific Translation Servie, Inc., Ann Arbor, Mich., 17p., 1966.

The influence of meteorological parameters on the diffusion of stack gases is considered, using the theory of turbulent propagation to find the location of the maximum emission concentration at ground level. Wind velocity, wind direction, scattering values, and stability parameters are included in the theoretical equations. While the mean horizontal wind-vector may account for the tracer of the harmful gas, stability parameters control the horizontal and vertical variance of its displacement. The investigation is based on empirical relations between vertical spread and distance from results obtained by F. Pasquill for different types of atmospheric conditions. Using hourly meteorological observations from the Vienna airport, the maximum ground level concentration of pollutants emitted from a 50-m high chimney with known output of gas was computed.

16783 APTIC NO. 34482

Saxena, Umesh and Keh C. Tsao

NEW METHOD TO FORECAST AIR POLLUTANT CONCENTRATIONS. *Preprint, American Society of Mechanical Engineers, New York, 9p., 1971. 14 refs. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D. C., Nov. 28-Dec. 2, 1971, Paper 71-WA/APC-1.)*

Daily average suspended particulate concentrations from a high volume sampler taken in downtown Milwaukee were analyzed using the autoregressive-moving average models. Analysis included a three-stage procedure: identification of a canadidate model; estimation of the parameters and the precision associated with them; and a diagnostic check for the adequacy of a fitted model. The method is inherently iterative in nature as different models are constructed and improvements of the models are sought until a satisfactory representation is established. The first-order moving average model characterized the data very well, and the one-step-ahead forecast indicated that 55% of all the observations agreed, within 10%, with the predicted values. The results show even better agreement in the high concentration range. Only four percent of the data deviated by more than 50%. (Author abstract modified)

16784 APTIC NO. 34793

Schikarski, W., P. Jansen, and S. Jordan

AN APPROACH TO COMPARING AIR POLLUTION FROM FOSSIL-FUEL AND NUCLEAR POWER PLANTS. *International Atomic Energy Agency, Vienna (Austria), and Atomic Energy Commission, Washington, D. C., Symp. Environ. Aspects Nucl. Power Stations, New York, 1970, p. 877-889. 16 refs. (Aug. 10-14, Paper 146/57.)*

Steam power plant stations fueled with different types of fuel, such as fossil fuel or nuclear fuel, have often been compared on the basis of the economics of the fuel cycle, of the capital costs, and of other economic parameters. Since very little has been published on comparisons of other important characteristics, air pollution aspects of fossil and nuclear power plants are discussed. Fossil-fuel plants pollute the atmosphere by the emission of reactive gases (sulfur oxides) and smoke (aerosols), whereas nuclear power plants could emit radioactive gases (fission gases) and radioactive aerosols which affect the environment in a different way. A model was developed on the basis of the maximum permissible concentrations set by biophysical and medical bodies for the various pollutants. Calculations are discussed, and results from German power plants are given. (Author abstract modified)

16785 APTIC NO. 34935

Semonin, Richard G.

STUDY OF RAINOUT OF RADIOACTIVITY IN ILLINOIS. (NINTH PROGRESS REPORT). *Illinois State Water Survey, Urbana, Atomic Energy Commission Contract AT(11-1)-1199, Nov. 1970, 67p. 25 refs.*

NTIS: COO 19919

Preliminary findings are reported for the Illinois Tracer Experiment (ITEX) project involving the release of indium and/or lithium tracers to the updrafts of convective clouds to estimate the scavenging efficiency of clouds so treated and also for the experimental determination of collection efficiencies of falling drops as a function of their size and electrical charge. The ITREX project was conducted over and within the Water Survey Central Illinois Network of 986 recording raingages in a 1600 sq mi area. Deposition patterns in rainwater were calculated for four trace metals in the indium and lithium flares: lithium, sodium, magnesium, and potassium. Each of the deposition patterns showed a surprisingly similar aerial distribution of the four elements. Furthermore, the correlation coefficient between the lithium and sodium values for all cases was greater than 0.90, indicating that the elements are chemically complexed in the flare effluent and removed by rain in the same way. The laboratory studies showed that the scavenging efficiency of raindrops for Bacillus subtilis spores increases linearly with increasing charge (correlation efficient greater than 0.98). No charge greater than 10 to the minus 16th power coulombs was observed. Only for 3.74-mm drops was there any tendency for increased collection with one sign of charge.

16786 APTIC NO. 34537

Singer, S. Fred

STRATOSPHERIC WATER VAPOUR INCREASE DUE TO HUMAN ACTIVITIES. *Nature (London), 233(5321):543-545, Oct. 22, 1971. 35 refs.*

The estimated rate of injection of water vapor into the atmosphere from methane produced by human-related activities is 1,700,000 g/s or the same order of magnitude as that injected by a fleet of supersonic transports. The methane source has a more significant effect on the stratospheric ozone concentration than does the water vapor injected directly from the troposphere or prospective supersonic jets. This is because atomic oxygen plays an important role in the oxidation of methane and is, therefore, removed and made unavailable for ozone production. A reduction in stratospheric ozone would result in increased ultraviolet radiation and thus increase the incidence of skin cancer.

16787 APTIC NO. 34700

Son kin, L. P. and T. M. Matveyeva

ON THE PROPERTIES OF TEMPERATURE PROFILES FORMATION IN A 500-METERS ATMOSPHERIC SUBSTRATUM ABOVE THE EUROPEAN TERRITORY OF THE U.S.S.R. *(Nekotoryye osobennosti formirovaniya temperaturnykh profiley v nizhnem 500-metrovom sloye nad evropeyskoy territoriyey SSSR). Text in Russian. Tr. Gl. Geofiz. Observ. (Leningrad), no. 207:133-137, 1968. 3 refs.*

Temperature profiles of the lowest 500 m of the atmospheric stratum are presented which were obtained by airplane probes. Surface inversion, raised inversion (lower boundary not more than 500 m), and non-inversions were found. Frequency of non-inversion profiles decreased from west to east and surface inversions occurred more often in the east. Raised inversions in the lower 500 m occurred during the winter. Surface inversions decreased and non-inversions increased from nightly to daily hours. The change in the frequency of occurrence during the year is given. Also, the depth of the surface inversion and the lower limit of the raised inversion were determined. The connection between temperature profiles and synoptic situa tions in the Moscow region was studied. The frequency of the various profiles during a specific month and corresponding temperature anomalies are analyzed.

16788 APTIC NO. 34876

Sonkin, L. R., Ye. A. Razbegayeva, and K. M. Terekhova

ON THE METEOROLOGICAL CONDITIONALITY OF URBAN AIR POLLUTION. *(K voprosu o meteorologicheskoy obuslovlennosti zagryazneniya vozdukha nad gorodami). Text in Russian. Tr. Gl. Geofiz. Observ. (Leningrad), no. 185:44-54, 1966. 25 refs.*

The contribution of various meteorological factors such as wind, atmospheric stability, and atmospheric temperature or precipitation on urban air pollution is reviewed throughout the world literature and illustrated by data obtained in the cities of Leningrad and Moscow between 1961 and 1964. A general characterization of air pollution in these cities was expressed in terms of percent iteration of pollutant concentrations above the admitted standards, as compared to the total figure of observations. Thus, dust concentrations appear to be in 17% and hydrogen sulfide concentrations appear to be in 19% of the cases above the admitted limit in Leningrad between 1961-1963. A maximum of dust pollution is seen in Leningrad during the spring season while minimum values for this parameter are seen during the winter (initial period) and summer seasons. Peak values for hydrogen sulfide are seen during the February March periods in Leningrad as well as in Moscow. It appears that the annual trend of urban air pollution is determined by the air circulation processes rather than by the conditions of emanation. The graphs expressing the variation of air pollution as related to wind speed indicate two peaks, one in conditions of air stability and one under wind speeds ranging between 4 and 6 m/sec. The first peak reaches higher values in winter while the latter peak becomes higher in summer, mainly in terms of hydrogen sulfide. Intense degrees of air pollution seem to be determined essentially by anticyclones of low mobility. The clean air appearing in cyclone conditions seems to be due to precipitation and strong winds. The conditions of air pollution are concluded to depend mainly on the macrometeorological processes for both the given emission source and the pollutant. The physical mechanisms of the air polluting process needs further theoretical and empirical investigation in order to solve the problem of air pollution prognosis.

16789 APTIC NO. 34479

Soo, S. L.

DIFFUSION AND FALLOUT OF PARTICULATES EMITTED BY AIRCRAFT ENGINES. *Preprint, American Society of Mechanical Engineers, New York, 12p., 1971. 21 refs. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D. C., Nov. 28-Dec. 2, 1971, Paper 71-EA/Av-2.)*

Measurements have shown that aircraft contribute an increasing fraction of total community emission of pollutants. For given engines and fuels, the effect of pollutants around an airport can be reduced through operating procedures that consider the nature of diffusion and fallout of pollutants, including particulates during the idle, taxi, take-off, land, approach, and cruise modes of flight. Data and relations for the path of the plume in these flight modes can be determined from those for stacks, including effect of crosswind, buoyancy, and density gradient in the atmosphere. Diffusion and fallout are correlated as a moving source problem, and the effect of wing-tip vortices is discussed, as well as plume visibility and monitoring, simulation, and modeling. (Author abstract)

16790 APTIC NO. 34732

Southey, R. F. W. and G. J. Harper

THE SURVIVAL OF ERWINIA AMYLOVORA IN AIRBORNE PARTICLES: TESTS IN THE LABORATORY AND IN THE OPEN AIR. *J. Appl. Bacteriol., 34(3):547-556, Sept. 1971. 17 refs.*

The survival of airborne bacteria (Erwinia amylovora), which causes fire-blight on fruit trees, was investigated in laboratory and open air environments. The experimental procedures are described and complete results are included. The bacteria survived well when contained in small airborne particles held in the laboratory at relative humidities between 40 and 90%. Although greater loss of viability was determined for exposure of the simulated aerosols to the open air, significant number of organisms were still viable after two hours. (Author abstract modified)

16791 APTIC NO. 34415

Sutton, Kenneth and Randolph A. Graves, Jr.

A GENERAL STAGNATION-POINT CONVECTIVE HEATING EQUATION FOR ARBITRARY GAS MIXTURES. *National Aeronautics and Space Administration, Hampton, Va., Langley Research Center, NASA TR-R-376, TR-L7885, Work UNIT 117-07-01-01, 64p., Nov. 1971. 60 refs.*

The stagnation-point convective heat transfer to an axisymmetric blunt body for arbitrary gases in chemical equilibrium was investigated for base gases of nitrogen, oxygen, hydrogen, helium, neon, argon, carbon dioxide, ammonia, methane, and their mixtures. Study enthalpies ranged from 2.3 to 116.2 MJ/kg; pressures were 0.001-100 atmospheres; wall temperatures were 300 and 1111 K. A general equation for the stagnation-point convective heat transfer was derived as a function of mass fraction, molecular weight, and transport parameter of the base gases. The analysis verified that the convective heat transfer in gas mixtures could be determined from a summation relation involving the heat transfer coefficients of the base gases. (Author abstract modified)

16792 APTIC NO. 34480

Swartman, Robert K., Vinh Ha, Michel Julien, and David J. Whitney

EFFECTS OF POLLUTION ON SOLAR ENERGY. *Preprint, American Society of Mechanical Engineers, New York, 4p., 1971. 9 refs. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D. C., Nov. 28-Dec. 2, 1971, Paper 71-WA/Sol-12.)*

A review of the solar radiation received by the earth is followed by a discussion on attenuation of solar radiation by atmospheric pollutants. The major air pollutants, most resulting from the combustion of fossil fuels, are carbon monoxide, sulfur and its oxides, nitrogen oxides, hydrocarbons and solid particles, ammonia, hydrogen sulfide, and aldehydes. Some atmospheric pollutants, such as carbon monoxide, water vapor, and solid particles, could affect the amount of solar radiation reaching the earth, but it is not clear if it would be more scattering back into space or more absorption, and if the consequence would be a decrease or an increase in the mean temperature of the earth. Other pollutants, such as nitrogen oxides and sulfur oxides, would alter the quality, rather than the quantity, of solar radiation by initiating processes capable of removing ozone from, or adding it to, the atmosphere, thus changing the present natural filter to ultraviolet radiation. (Author abstract modified)

16793 APTIC NO. 34730

Tebbens, Bernard D., Mitsugi Mukai, and Jerome F. Thomas

FATE OF ARENES INCORPORATED WITH AIRBORNE SOOT: EFFECT OF IRRADIATION. *Am. Ind. Hyg. Assoc. J., 32(6):365-372, June 1971. 9 refs.*

Photochemical transformation is one of several mechanisms that account for the disappearance of arenes from the atmospheric environment. The airborne carcinogens contained on soot disappeared slowly in the dark, probably due to the presence of oxidizing material coproduced and carried with the carcinogens on the soot particles. The arenes disappeared much more rapidly during exposure to light, with a rate proportional to the intensity of the irradiation. The amount disappearing under the influence of light was directly related to the surface area of the particle. The sequential degradation from carcinogen through intermediates to final stable compounds is discussed. (Author abstract modified)

16794 APTIC NO. 34806

Tonna, G.

MIE EXTINCTION COEFFICIENT FOR SPHERICAL PARTICLES. *Consiglio Nazionale delle Ricerche, Rome (Italy), Inst. di Fisica dell Atmosfera, 25p., June 1970. 9 refs.*

NTIS: N71-21376

Values of the Mie extinction coefficient for spherical particles and the real refractive index were reported. Calculations were carried out for the following refractive indices, size parameter range, and increments: m equals 1.33, aplha equals 0.1(0.1)200; m equals 1.55, alpha equals 0.1(0.1)30. The lower and upper limits of alpha were chosen in order to span the radius range of fog droplets and condensation nuclei respectively. The figures reported are believed to be valid to seven significant figures. A program for the IBM 1130 computer was used for the computations.

16795 APTIC NO. 34638

Tsang, Gee

LABORATORY STUDY OF TWO-DIMENSIONAL STARTING PLUMES. *Atmos. Environ., 4(5):519-544, Sept. 1970. 8 refs.*

A detailed laboratory study was undertaken of two-dimensional starting plumes. From dimensional analysis, equations in a parametric form for the motion of two-dimensional starting-plumes are derived. The governing equations are also obtained from an approximate inviscid flow approach. Systematic experiments were performed with each parameter under careful control. A buoyant starting plume had a typical tadpole shape. Some time after its release, a buoyant starting plume will advance with a constant rate, and this advancing velocity increases as the rate of buoyancy inflow is increased. The inflow momentum affects the motion of a buoyant two-dimensional starting plume to a certain extent, but this effect is short-lived and may be neglected after a short time. The shape of a buoyant starting plume depends on the initial density difference. The tail of the plume increases as the initial density difference is increased. If the rate of buoyancy inflow is the same, plumes having a larger initial density difference will advance faster. Detailed flow patterns of two-dimensional starting plumes under different parametic conditions are obtained from the experiments. From the detailed flow patterns, 0the distribution of velocity components, vorticity and velocity gradients in the flow field of a two-dimensional starting plume, is also obtained. Integration of the vorticity in the flow field supports the approximate inviscid flow approach in obtaining the governing equations. (Author abstract modified)

16796 APTIC NO. 34877

Vasilchenko, I. V.

THE DEPENDENCE OF THE TURBULENCE COEFFICIENT ON THE VERTICAL TEMPERATURE AND WIND GRADIENTS WITHIN THE LOWER 300 M LAYER ACCORDING TO AEROSTATIC PROBE DATA. *(O svyazi koeffitsienta turbulentnosti s vertical-nym raspredeleniyem temperatury i vetra v nizhnem 300-metrovom sloye po aerostatnym dannym). Text in Russian. Tr. Gl. Geofiz. Observ. (Leningrad), no.185:68-71, 1966. 5 refs.*

A series of observations in locations near giant thermoelectric power plants were performed to explore the meteorological factors affecting the diffusion of air pollutants. Aerostatic observations obtained data on the vertical temperature and wind distribution pattern during the winter and summer seasons; the pulsations of the vertical and horizontal components of the wind velocity were computed. Thus the turbulence coefficients at 100, 200, and 300 m of altitude could be determined. Observations were carried out under various conditions of stratification of the lower atmospheric layers, ranging from unstable to inversion and under conditions from mild to strong winds; thus, the dependence of the value of the turbulence coefficient on the specific vertical temperature and wind distribution within the lower 300 m atmospheric layer could be studied. The turbulence coefficient was computed by means of Lyapin s formula. Further research is needed in order to pinpoint the specific relationship between the turbulence coefficient and the parameters of the wind and temperature fields.

16797 APTIC NO. 34467

Velds, C. A.

AIR POLLUTION THROUGH CHIMNEY SMUTS. PART I. THEORETICAL ASPECTS OF THE PROBLEM OF INCREASING AIR POLLUTION. *(Luchtverontreiniging uit schoorsteenpluimen. I. theoretische uiteensetting van het probleem van de verspreiding van luchtverontreiniging). Text in Dutch. Polytech. Tijdschr., Ed. Procestechniek (The Hague), 16(18):703-709, Sept. 1971.*

The theoretical aspects of the problem of air pollution are discussed. Three levels of air pollution are emissions due to the source, dispersion in the atmosphere, and its subsequent intake by the people and animals. These circumstances are described in detail. Molecular diffusion and turbulent diffusion are discussed. The turbulence is dependent on three factors: mechanical turbulence, wind shear, and vertical temperature gradient. The vortices have a very large range of dimensions from a few centimeters to couple of kilometers. They influence the dispersion process considerably. The dispersion of air pollutants depends on the wind direction and speed. Results, from an earlier investigation, of the exit velocity through chimney smuts of steam boilers are tabulated as a function of chimney height.

16798 APTIC NO. 35008

Velds, C. A.

AIR POLLUTION FROM PLUMES. *(Luchtverontreiniging uit schoorsteenpluimen). Text in Dutch. Polytech. Tijdschr., Ed. A, 26(22):878-885, 1971.*

Methods are described for calculating effective chimney height and the plume rise of hot and cold gases. The influence of adjacent chimneys is analyzed, as well as siting for the chimney relative to the environment.

16799 APTIC NO. 34340

Veya, R.

COOLING TOWERS IN NUCLEAR POWER PLANTS AND THE INFLUENCE ON THE ENVIRONMENT. *(Kuehlturmkuehlung in Kernkraftwerken und Umweltbeeinflussung). Text in German. Technica, 20(23):2319-2321, 1971.*

Natural draft cooling towers are used in Switzerland in nuclear power plants wherein the heat which cannot be utilized in the steam turbine is discharged into the atmosphere. The natural draft tower is based on the evaporation principle. In order to make full use of thy cold air developing during evaporation, the water is atomized in the lower section of the tower. An evaporation surface is about one square kilometer is provided. Warm air saturated with water vapor is emitted from the cooling tower causing a visible plume which eventually mixes with the ambient air. At some distance from the tower, the length is determined by the meteorological conditions, the plume dissolves. Each second about 500 l water is emitted by the cooling tower in connection with a flow of air of about 30,000 cu m/sec. This water emission hardly increases the relative humidity of the ambient air. In high towers, the plume which still has thermal buoyancy hardly affects the ground. Fog develops only in the presence of natural fog. Droplet emission is largely avoided by the installation of droplet separators. Neither the heat nor the humidity discharged into the atmosphere cause any marked climatic change.

16800 APTIC NO. 34318

Watt, Arthur D.

PLACING ATMOSPHERIC CO2 IN PERSPECTIVE. *IEEE (Inst. Elec. Electron. Engrs.) Spectrum, 8(11):59-72, Nov. 1971. 32 refs.*

Each year, approximately one tenth of the carbon dioxide in the atmosphere (320 ppm by volume) is exchanged at ocean and land surfaces, with the biosphere playing a decidedly important role. At present, man is injecting into the atmosphere approximately two times 10 to the 10th power ton of CO2/yr as a result of fossil-fuel burning. This is about 10% of the annual exchange and one percent of the atmospheric total. The largest input of CO2 to the atmosphere is derived from the tropical oceans, amounting to an estimated 15 times 10 to the 12th power tons. Rate of exchange is governed primarily by temperature, pH, and wave action. Also of great importance is the continued removal of CO2 by plant growth. Despite the delicate balances contributing to the overall exchange rate, atmospheric CO2 levels are increasing by about 0.75 times 10 to the 10th power tons/yr, over a third of the amount introduced by burning of fossil fuels. The estimated 40 ppm increase in CO2 over the last century may have contributed to a global temperature increase of the order of 0.2 K. Since 1940, however, the global atmospheric temperature has been decreasing -- an indication that factors such as atmospheric dust are of much greater importance in determining the overall global heat balance.

16801 APTIC NO. 34360

Wilkins, E. M.

VARIATIONAL PRINCIPLE APPLIED TO NUMERICAL OBJECTIVE ANALYSIS OF URBAN AIR POLLUTION DISTRIBUTIONS. *J. Appl. Meteorol., 10(5):974-981, Oct. 1971. 5 refs.*

Variational calculus is applied to optimize the adjustments between air pollution concentration patterns displayed at two different times. Specifically, pattern inconsistencies between successive isopleth presentations are removed by using the diffusion equation as a dynamical constraint. A sample problem is solved for the functional expression of the corrections to be applied. With slight modifications, the method can be applied for reduction of off-time observations to a common synoptic pattern. The variational principle can also be used in automatic pollution-isopleth drawing routine to fill in (using dynamical constraints) concentration estimates at grid points where no direct measurements are available.

BASIC SCIENCE AND TECHNOLOGY

16802 APTIC NO. 34948

NEW DIRECTIONS IN ION-SELECTIVE ELECTRODES. *Chem. Eng. News, 48(27):40-41, June 29, 1970.*

Ion-selective membrane electrodes measure the activities of unassociated ions in solution with a sensitivity often less than one part/billion. The selectivity of the electrodes is such that they can be used in electrolyte solutions containing other species either present naturally or added to control the ionic strength and pH of the solution. There are now more than 20 electrodes available for more than 20 ions, including alkali and alkaline earth ions, heavy metal ions, and a wide variety of anions such as fluoride, nitrate, sulfide, and perchlorate. In recent work, ion-selective electrodes were used to measure formation constant in adenosine triphosphate complexes, complex formation of calcium, magnesium, and beryllium ions with biologically important ligands, and lead in urine samples.

16803 APTIC NO. 34607

Aleksandrov, Yu. A., B. I. Tarunin, and V. A. Shushunov.

KINETICS OF REACTIONS BETWEEN OZONE AND COMPLETE ETHYL COMPOUNDS OF SILICIUM, GERMANIUM, TIN, AND LEAD. *(Kinetika reaktsii ozona s polnymi etilnymi soyedineniyami kremniya, germaniya, olova i svintsa). Text in Russian. Kinetika i Kataliz, 12(4):898-902, 1971. 5 refs.*

The kinetics of the ozonolytic process of silicon, germanium, tin, or lead tetraethyl derivatives between zero and 25 C were investigated. A known amount of the tetraethyl compound was introduced into a certain volume of ozone saturated carbon tetrachloride under conditions of continuous bubbling of an ozone-oxygen mixture. The rate of the reaction was measured by spectrophotometric ozone determinations before and after ozonolysis. Rate constants for the bimolecular mechanisms of the reactions are computed. The practical meaning of the equation describing the reaction rate constant consists in its variation according to the affinity of the tetraethyl derivative towards ozone. Specific kinetic curves were obtained for ozonolysis of the less active tetraethyl derivatives of germanium and silicon, such curves presented a different trend in the case of lead or tin tetraethyl derivatives. Ozonolysis of tetraethyl lead or tetraethyl tin appeared to be a first order reaction with respect to both ozone and the initial tetraethyl compound when the effect of its initial concentration on the reaction rate was studied. The temperature dependence of the rate constant for all studied tetraethyl derivatives satisfied the Arrhenius equation. A parallelism between the variation of the rate constant and the nucleophilicity of the heteroatom contained by the tetraethyl compound was established.

16804 APTIC NO. 34435

Basov, Yu G. and G. M. Panchenkov

ISOTOPE EFFECTS IN RELAXATION PROCESSES IN GASES. *Russ. J. Phys. Chem. (England translation from Russian of: Zh. Fiz. Khim.), 45(5):746), May 1971.*

Expressions are given for calculating the isotope separation factor in the vibrational relaxation of diatomic molecules in pure gass and in the relaxation of polyatomic molecules in a given gas. Separation factors obtained with the formulae are listed. The role of hydrogen atoms in facilitating energy transfer is discussed.

16805 APTIC NO. 34474

Bhaduri, D. and S. Bandyopadhyay

COMBUSTION IN COAL DUST FLAMES. *Combustion Flame, 17(1): 15-24, Aug. 1971. 19 refs.*

Essenhighs and Csaba's model for plane flame propagation through a coal dust cloud was extended to incorporate heat generation due to chemical reaction. The dust cloud was assumed to be monodisperse, and the temperature difference between the particles and the surrounding gas was neglected. The heat generation function is valid for the entire reaction zone, and the dust is heated simultaneously by the heat radiated from the flame front and by the heat generated by chemical reaction within the dust cloud. The energy equation representing the system is a nonlinear differential one and can be solved numerically for the evaluation of burning velocity, temperature profile, and the heat geveration rate along the flame axis. Work on plane flame-predicting characteristics was extended to include the affect of excess air in the coal dust-air mixture. The plane flame model was further extended for a jet flame to evaluate flame characteristics. (Author abstract modified) 0

16806 APTIC NO. 34619

Bodman, S. W., P. L. T. Brian, and T. C. Chang

THERMAL CONDUCTIVITY OF A NONEQUILIBRIUM CHEMICALLY REACTING GAS. *Am. Inst. Chem. Engrs. J., 17(6):1304-1310, Nov. 1971. 38 refs.*

The thermal conductivity of dissociating nitrogen dioxide (2NO2 in equilibrium with 2NO + 02) was measured at one to 30 atm and 548 to 793 K. Under these conditions, the gas mixture was not in chemical equilibrium and the rate of energy transport was limited by the rates of the forward and reverse reactions. However, the thermal conductivity was significantly augmented by the chemical reaction. The experimental results agreed very well with a theoretical model base on a linearized reaction rate expression. The chemical reaction rate constant as well as the activation energy for the decomposition of NO2 determined from the measurements were in good agreement with chemical kinetic data reported in the literature. This illustrates the utility of thermal conductivity measurements in obtaining chemical kinetic data for a nonequilibrium, chemically reacting gas mixture. (Author conclusions modified)

16807 APTIC NO. 34702

Boening, P.

THEORY OF CHARGING PHENOMENA ON DUST, PAPER AND TEXTILES. *Elektrotech. Z.A., 73(20):655-658, Oct. 1952. 11 refs. English translation from German. Sanzare Assoc., Inc., Philadelphia, Pa., 17p.*

The theory of charge phenomena is explained with reference to dust, paper, and textiles. The explanation originates from the precondition that a polar or selective adsorption of ions takes place on the boundaries between solid materials and gases (or liquids) so that one type of ion is adsorbed directly and more strongly, while the other forms a second, outer, only loosely bound layer. Through mechanical events, e.g. impaction, air streams, and shaving, the outer charge layer is removed so that the solid material is no longer neutral electrically. On the other hand, the removed charges can be deposited on other bodies which then become charged. Spark discharges may occur on account of these events. Countermeasures are discussed. (Auuthor summary modified)

16808 APTIC NO. 34431

Carlson, Thomas A. and A. E. Jonas

ANGULAR DISTRIBUTION OF THE PHOTOELECTRON SPECTRA FOR AR, KR, XE, H2, N2, AND CO. *J. Chem. Phys., 55(10):4913-4924, Nov. 15, 1971. 30 refs.*

The distribution of photoelectrons as a function of the angle between the direction of the incoming photon and outgoing photoelectron was measured for argon, krypton, xenon, hydrogen, nitrogen, and carbon monoxide. The experiments were carried out with a double focusing electrostatic electron spectrometer to which has been attached a chamber containing a gas discharge lamp that can be freely rotated. The 584 A, 736, and 744 A resonance lines were used as photon sources. For each of the photoionization bands studied, the angular distribution could be fitted to the general shape predicted from theory. In addition, the values of the parameter beta experimentally determined were in good agreement with theoretically determined values for H2 and for the rare gases but only partially satisfactory agreement for the first ionization potential of N2. The Pi states of N2+ and CO+ give lower values of beta than the Sigma state according to expectations. In general the vibrational structure for a given band was independent of the angle between the direction of the incoming photon and outgoing photoelectron, but several exceptions were found for both N2 and CO, which have been discussed in terms of the presence of autoionization states and possible breakdown in the Born-Oppenheimer approximation. (Author abstract modified)

16809 APTIC NO. 34659

Clark, A. H. and B. Beagley

ELECTRON-DIFFRACTION INVESTIGATIONS OF GASEOUS SULPHUR DIOXIDE AND TRIOXIDE. *Trans. Faraday Soc., 67(8):2216-2224, Aug. 1971. 22 refs.*

Electron-diffraction intensity data were collected for gaseous sulfur dioxide (250 K) and trioxide (300 K) at camera lengths of 50 and 25 cm. Least squares refinement led to the interatomic distances, root-mean-square amplitudes of vibration, and estimated standard deviations. The trioxide is planar within experimental error, while the angle for the dioxide is 118.5 plus or minus 1.0 deg. For both molecules, spectroscopic estimates of the vibrational amplitudes were made from force-constant data, and for sulfur dioxide these are in satisfactory agreement with the diffraction results. For sulfur trioxide, however, agreement is poorer, and this may indicate the presence of a small amount of S309 trimer in the diffracting vapor. Mean-square parallel and perpendicular amplitudes of vibration and centrifugal distortion corrections were also calculated for both molecules. (Author abstract modified)

16810 APTIC NO. 34358

Coope, J. A. R.

SENFTLEBEN EFFECTS IN THE PASCHEN-BACK LIMIT. THE SENFTLEBEN EFFECT IN NO2. *Mol. Phys., 21(2):217-223, June 1971. 11 refs.*

For certain paramagnetic gases composed of orbitally nondegenerate molecules, the effects of a magnetic field on the transport properties become independent of the magnitude of the field in the Paschen-Back limit. Instead of being functions of H/p, they are functions of particle displacement/p in the z direction/p, where particle displacement in the z direction scales the NS-coupling. This is the explanation of the Senftleben effect in nitrogen dioxide. Similar behavior is predicted for oxygen.

16811 APTIC NO. 34325

Dobbie, R. C.

THE REACTION OF TRIFLUOROMETHYLPHOSPHINO-COMPOUNDS WITH NITRIC OXIDE. *J. Chem. Soc. A, no. 18:2894-2897, 1971. 24 refs.*

The oxidation of some uncoordinated trifluoromethylphosphino compounds by nitric oxide was investigated. The reactions were carried out in a vacuum system and infrared spectra were recorded on a spectrometer. Nitric oxide reacted with difluorotrifluoramethylphosphine, fluorobistrifluoromethylphosphine, tristrifluoromethylphosphine, and some compounds containing P-P bonds at 20 to 100 C. The oxidation of fluorobistrifluoromethylphosphine and tetrakistrifluoromethyldiphosphine gave the new compounds bistrofluoromethylphosphinic fluoride bistrifluoromethylphosphinic anhydride, respectively. The reactions studied and the products obtained are summarized in tabular form.

16812 APTIC NO. 34402

Dunn, Michael G.

MEASUREMENT OF C+ PLUS E- PLUS E- AND CO+ PLUS E- RECOMBINATION IN CARBON MONOXIDE FLOWS. *AIAA (Am. Inst. Aeron. Astronaut.) J., 9(11):2184-2191, Nov. 1971. 30 refs.*

The carbon(+) plus e(-) plus e(-) three-body recombination rate coefficient and the carbon monoxide (+) plus e(-) two-body dissociative recombination rate coefficient have been measured in carbon monoxide plasmas that have been expanded from equilibrium reservoir conditions of 7060 K at 17.3 atm pressure and 6260 K at 10.0 atm pressure, respectively. One of the basic objectives of the first missions to Mars and Venus will probably be the determination of the composition of the atmosphere, not only near the surface, but throughout the entry trajectory. The success of these missions is partially dependent upon the ability to calculate the gas composition in the plasma surrounding the entry body. At the present time attention is confined to reactions involving ions and/or electrons because of the potential communication blackout problem. In order to obtain the CO(+) de-ionization rate coefficient it was necessary to estimate the rate coefficients for several of the charge-transfer reactions. The pressure driven shock tube and experimental technique are described, as well as the method for determining the rate coefficient. The procedure for calculating the electron-density distribution and the chemical model utilized are indicated. Langmuir-probe and microwave interferometer measurements are described.

16813 APTIC NO. 34857

Fifer, R., R. Moreau, and S. H. Bauer

THE REACTIONS BETWEEN SO2 AND C2H2 (AND C2H4) AT ELEVATED TEMPERATURES. A SINGLE-PULSE SHOCK TUBE INVESTIGATION. *Intern. J. Chem. Kinet., vol. 3:249-268, 1971. 38 refs.*

The high-temperature reaction between sulfur dioxide and acetylene in an excess of argon was studied in a single-pulse shock tube. Mixtures ranging from 1.8% to 5.40% SO2 and 1.60% to 4.90% C2H2 were heated to reflected shock temperatures of 1550-2150 K, for dwell times of about 0.6 msec and gas dynamically quenched. Total reaction densities were 0.89 to 0.054 moles/l. The reaction products were analyzed by gas chromatography. A technique was developed for separating argon, ethylene, C2H2, SO2, carbon monoxide, carbon dioxide, hydrogen sulfide, carbon oxysulfide, and carbon disulfide. The major products of the reaction are CO, hydrogen, CS2, and sulfur. The products observed were compared with those predicted on the assumption that equilibrium was attained. Several preliminary experiments were carried out with ethylene-sulfur dioxide mixtures, and the results indicated that for this combination the sulfur dioxide probably reacted with acetylene generated from the decomposition of the ethylene, rather than directly with the ethylene. The rate of decline in the sulfur dioxide content in C2H2-SO2 mixtures was approximately second order. (Author abstract)

16814 APTIC NO. 34959

Fricke, L. B., P. T. Wooler, and H. Ziegler

A WIND TUNNEL INVESTIGATION OF JETS EXHAUSTING INTO A CROSSFLOW. VOLUME III. ADDITIONAL DATA FOR TWO-JET CONFIGURATIONS. *Northrop Corp., Hawthorne, Calif., Aircraft Div., Air Force Flight Dynamics Lab. Contract F33615-69-C-1602, Proj. 698BT, Task 698BT01, Rept. AFFDL-TR-70-154, 495p., Dec. 1970.*

NTIS, DDC: AD 720233

A low speed wind tunnel test of a four-foot diameter circular plate model with up to three exhausting jets was conducted to determine surface static pressure distributions, jet paths, and jet decay characteristics in the presence of a crossflow. Data were obtained for the one-jet configuration with the jet exiting at a number of angles to the plate and at various velocity ratios and sideslip angles. Two-jet arrangements were tested with the jets exiting normal to the plate for three different spacings between the two jets and at a number of velocity ratios and sideslip angles. Three-jet configuration data were obtained with the jets exiting normal to the plate for a number of velocity ratios and sideslip angles. As a result of this investigation, several conclusions are deduced pertaining to the interaction of multiple jets exhausting into a crossflow. The present volume contains additional data pertaining to the two-jet configuration. (Author abstract modified)

16815 APTIC NO. 34786

Gary, G. A. and P. D. Craven

ELECTROMAGNETIC SCATTERING BY CYLINDERS. AN INTRODUCTION. *George C. Marshall Space Flight Center, Huntsville, Ala., Space Sciences Lab., NASA TM-X-64545, 63p., Sept. 16, 1970. 10 refs.*

NTIS: N71-12569

An introduction to the scattering of electromagnetic waves by cylinders is presented. The basic scattering features particular to cylinders are discussed from the Rayleigh-Gans theory. A review of electromagnetism and a derivation of dipole radiation are presented. Basic scattering theory is given. A computer program to calculate the scattering intensity functions is presented. (Author summary modified)

16816 APTIC NO. 34760

Hauff, Lothar

PROCESS AND APPARATUS FOR DISCONTINUOUS EXTRACTION OF SOLID SUBSTANCES, ESPECIALLY FOR THE DECAFFEINIZATION OF GREEN COFFEE. *(Verfahren und Vorrichting zur diskontinuierlichen Extraktion von Feststoffen, insbesondere zur Entkoffeinierung von Rohkaffee). Text in German. (Lothar Hauff, Berlin (East Germany)) Ger. Pat. 69,579. 2p., Nov. 5, 1969. (Appl. Feb.16, 1968, 5 claims).*

The extraction method described shortens the time of 24 to 36 hours required to decaffeinate green coffee beans by conventional methods. A simple apparatus and the usual solvents (chloroform, diethylether, amyalcohol, anilin, acetic acid, petrolether, ethylalcohol, n-pentane, gasoline, or chlorinated hydrocarbons) are used. The apparatus is a cylindrical extractor in which a vertical rotating perforated screw maintains a charge of presteamed whole coffee beans moving in the extraction solution in a whirlpool motion. The diameter of the screw, a hollow shaft with a spiral blade attached along the entire length of the cylinder, is 30% of the inner diameter of the extractor. The beans, which occupy 80% of the volume of the extractor, are transported by the rotating screw from the bottom of the extractor upward through the extraction solution; when they reach the top of the screw, they sink by gravity to the bottom to be picked up again. If a solvent is used that has a specific weight exceeding that of the coffee beans, the rotation of the screw is reversed and the beans, instead of sinking, float upward in the heavier solvent to be transported downward by the screw. To fully utilize the extractive power of the solvent, a battery of extractors connected in tandem is used in which the solvent flows in a countercurrent direction.

16817 APTIC NO. 34383

Hill, M. P.

DESORPTION SPECTRA AND SURFACE STRUCTURE. CARBON MONOXIDE PLUS TUNGSTEN SYSTEM. *Trans. Faraday Soc., 66(569):1246-1253, May 1970. 22 refs.*

The influence of surface structure on the chemisorption of carbon monoxide on tungsten has been examined by comparing desorption spectra from polycrystalline and single crystal ribbons, exposing predominantly (100) plus (111) and (113) planes respectively. Although a beta-two state is apparently absent on the (113) surface, in practice the desorption spectra are identical in the number of absorbed states, the activation energies of desorption, and the ratio of beta-one to beta-two plus beta-three molecules. The results indicate that the multiplicity of adsorbed states is not due to the natural heterogeneity of the surface in the CO plus tungsten system. An alternative mechanism is discussed involving cluster formation in the beta-layer. Desorption spectra were obtained by the slow-scan method because it is capable of higher resolution than the rapid flash desorption technique. (Author abstract modified)

16818 APTIC NO. 34535

Holland, Susan, D. T. Jones, and P. Gray

COMBUSTION SUPPORTED BY NITROUS OXIDE: FLAME SPEEDS AND FLAMMABILITY LIMITS IN THE HYDROGEN + ETHANE + NITROUS OXIDE SYSTEM. *Combustion Flame, 17(1):31-35, Aug. 1971. 14 refs.*

Flame speeds relative to the burned gas and composition limits of flammability were measured at subatmospheric pressures for the ternary system nitrous oxide plus hydrogen plus ethane. The form of flammability limits and the manner in which flame speed contours reflected the limits corresponded close to the behavior predicted by the Le Chatelier rule. As ethane replaced hydrogen, flame speeds fell from a maximum of 3560 cm/sec to a maximum of 1460 cm/sec, both maxima occurring in slightly rich mixtures. In lean mixtures, excess nitrous oxide did not survive the flame but was decomposed into its elements. The flame chemistry may be rationalized in terms of a transition from reactions appropriate to the flame in hydrogen plus nitrous oxide: N20 + H yields N2 + OH; H2 + OH yields H + H20 to ones in which ethyl and ethoxyl initially replace hydrogen and HO and to which subsequently ethoxyl decomposition also contributes. (Author abstract modified)

16819 APTIC NO. 34333

Imhof, R. E. and F. H. Read

MEASURED LIFETIMES OF THE FIRST SEVEN VIBRATIONAL LEVELS OF THE A 1PI STATE OF CO. *Chem. Phys. Letters (Amsterdam), 11(3):326-328, Oct. 15, 1971. 9 refs.*

Radiative lifetimes of the first seven vibrational levels of the A(1)Pi state of carbon monoxide were measured by the inelastic electron-photon coincidence method. The lifetimes decreased to a minimum value (8.97 sec plus or minus 0.35) at the third vibrational quantum number before increasing again. The measurements clearly indicate that the transition moment of the A-X transition has a quadratic or higher dependence on internuclear distance, rather than a linear dependence.

16820 APTIC NO. 34490

Izod, T. P. J., G. B. Kistiakowsky, and S. Matsuda

OXIDATION OF CARBON MONOXIDE MIXTURES WITH ADDED ETHANE OR AZOMETHANE STUDIED IN INCIDENT SHOCK WAVES. *J. Chem. Phys., 55(9):4425-4432, Nov. 1, 1971. 27 refs.*

Carbon monoxide/oxygen/argon mixtures of varying composition containing small concentrations of ethane or azomethane were investigated in incident shock waves at about 5.0 times 10 to the 17th power particle/cc total concentration. The reaction was followed by measuring the infrared emissions from carbon dioxide and carbon monoxide for about 1700-micron sec particle time over a temperature range from 1400-2200 K. For all mixtures, the rate of CO2 production initially increased exponentially and then became constant for several percent conversion. The observed (CO2)-time profiles were compared to those obtained by numerical calculation. For the CO/02/Ar mixtures containing either ethane or azomethane it was possible to describe the observations quantitatively in terms of a mechanism with a number of main reactions which are given, in addition to several relatively unimportant reactions involving chain carriers, O2 and C2H6. Rate constants are indicated. (Author abstract modified)

16821 APTIC NO. 34485

Jeffers, W. Q. and J. Daniel Kelley

CALCULATIONS OF V-V TRANSFER PROBABILITIES IN CO-CO COLLISIONS. *J. Chem. Phys., 55(9):4433-4437, Nov. 1, 1971. 24 refs.*

Detailed calculations are presented of vibration-vibration transfer probabilities in carbon monoxide-carbon monoxide collisions including both long-range and short-range interactions. Comparison is made with experimental data, and the results show that the relative contributions of the long and short-range interactions to the V-V transfer probability depend on energy defect and temperature. Calculations match the experimental data at 300 K to within 25%; at this temperature the short-range interactions dominate in determining the transition probability for vibrational energy defects greater than 210 cm-1, while the long-range interactions dominate for smaller defects. (Author abstract)

16822 APTIC NO. 34640

Kamel, Aida M., Alvin Felmeister, and Norman D. Weiner

THE INTERACTION OF NITROGEN DIOXIDE WITH MONOMOLECULAR FILMS OF CHOLESTEROL, DIHYDROCHOLESTEROL, AND CHOLESTERYL ACETATE. *Atmos. Environ., 4(5):469-473, Sept. 1970. 3 refs.*

The interaction of nitrogen dioxide with monomolecular films of cholesterol, dihydrocholesterol, and cholesteryl acetate was studied. In considering the behavior of these three films, it appears that two different and relatively independent reactions occur in the presence of NO2. One reaction involves the 3-hydroxy group and leads to products which tend to be desorbed from the surface. The other reaction involves the 5,6 double bond and leads to products which remain on the surface, and which occupy a larger area per molecule than the non-reacted molecule. Thus, the orientation of cholesterol at a gas/water interface, which is a function of surface pressure, influences both the rate of reaction and the reaction products in the presence of NO2. (Author abstract modified)

16823 APTIC NO. 34721

Khamad, M. A., Ye. I. Martiushin, and V. P. Pavlov

ON A CHARACTER OF MOTION OF A GAS-LIQUID MIXTURE IN A HORIZONTAL CHUTE-TYPE APPARATUS. *(O kharaktere dvizheniya gazo-zhidkostnoy smesi v barbotazhnom lotkovom apparate). Text in Russian. Teor. Osn. Khim. Tekhnol., 5(4):608-611, 1971. 7 refs.*

A tracer method for the study of movement rates within the lower bubbling layers flowing on sieve-like plates is described. The tracer consisted of a salt solution (sodium chloride or sodium nitrate) and was introduced into the system by a distributor. This operation constituted an impulse to the flowing system and appeared as a migrating concentration front. The electric conductivity of the system was determined by two electrodes 100 mm apart and connected with two conductometers; the signals received by the latter were then recorded on a loop-like oscillograph. The rate of movement of the concentration front was determined by a ratio between the distance between the electrodes (cm) and the time of its movement (in sec). Local rate distribution histograms reflecting 80-100 measurements indicated an almost normal distribution. The conditions of accession onto the plate (the diaphragm) appeared to affect considerably the rates of flow. These rates varied according to the level of the flow at both the incoming and the outgoing ends of the plate. The average rate profile of the gas-liquid system within the central portion of the plate (constituting 70% of its length) appeared to be close to the distribution occurring in single phase flows. An irregular distribution of gas levels within the bubbling layer along the gutter unit was found. The study of gas concentration distributions according to both height and length of gutter unit constitutes a problem for further investigation.

16824 APTIC NO. 35000

LeBreton, P. R., W. Mecklenbrauck, A. Schultz, and Ch. Schlier

ELECTRONIC EXCITATION IN FAST COLLISIONS OF NA WITH SO2 AND NO2. *J. Chem. Phys., 55(6):2940-2944, Sept. 15, 1971. 34 refs.*

A sputtered sodium beam was used to investigate collisionally induced electronic excitation in scattering with sulfur dioxide and nitrogen dioxide. Light from the radiative decay of excited electronic states was observed at several wavelengths, and measurements were made of the excitation cross sections as a function of the center-of-mass collision energy in the range 1-30 eV. The most intense light occurred in the region of 5890 A, which corresponds to the doublet D line (3-2P to yield 3-2S) of Na. The 3880 A wavelength corresponds to the strongly forbidden 4-2S to yield 3-2S transition; the 3410 A wavelength corresponds to no transition. Emission also occurred from transitions with long radiative lifetimes (approximately 40 microseconds). This emission is probably due to B1 to yield A1 molecular transitions of SO2 and NO2. Results are discussed in terms of a potential curve-crossing mechanism which seems to satisfactorily explain collisionally induced alkali atom excitation. For the molecular emission, an alternate mechanism was also considered which involves vibrational coupling of the A1 and B1 states. (Author abstract modified)

16825 APTIC NO. 34783

Lin, Jung-Tai

THREE THEORETICAL INVESTIGATIONS OF TURBULENT JETS. PART 1. A MOMENTUM LINE HYPOTHESIS FOR FREE TURBULENCE SHEAR FLOWS. *Iowa Univ., Iowa City, Iowa Inst. of Hydraulic Research, IIHR Rept. 127, p. 1-25, Jan. 1971. 8 refs.*

For free-turbulence shear flows, such as wakes or jets in parallel streams, a momentum-like hypothesis is introduced which states the normalized velocity defect or excess and the normalized shear stress are constants along lines of constant defect or excess, respectively, of momentum flux. Self-preservation of the mean turbulence quantities is found to occur in the region far downstream or near the boundary of free-turbulence shear flows, where the velocity defect or excess is much smaller than the convective velocity. The hypothesis is verified with experimental data reported by other investigators. (Author abstract)

16826 APTIC NO. 34781

Lin, Jung-Tai

THREE THEORETICAL INVESTIGATIONS OF TURBULENT JETS. PART 2. A NOTE OF AXISYMMETRIC TURBULENT JETS. *Iowa Univ. Iowa City, Iowa Inst. of Hydraulic Research, IIHR Rept. 127, p. 26-47, Jan. 1971. 9 refs.*

A new similarity formulation is investigated for the zones within and beyond the potential core region of turbulent jets. Depending on the characteristic behavior of the turbulent mixing, hyperbolic and exponential decays of the centerline longitudinal velocity are obtained for the zone of fully developed flow as a consequence of the preservation of the axial momentum flux. The rate of decay of the potential core region is obtained from the similarity analysis and is verified with experimental measurements previously reported. (Author abstract)

16827 APTIC NO. 34782

Lin, Jung-Tai

THREE THEORETICAL INVESTIGATIONS OF TURBULENT JETS. PART 3. A LOGARITHMIC TRAJECTORY FOR ROUND ISOTHERMAL JETS DISCHARGING PERPENDICULARLY INTO CROSS STREAMS. *Iowa Univ., Iowa City, Iowa Inst. of Hydraulic Research, IIHR Rept. 127, p. 48-59, Jan. 1971. 8 refs.*

In the zone of maximum deflection of a round jet in a cross stream, it is postulated that the fluid entrainment into the jet region is linearly proportional to the velocity of external stream and to the characteristic jet velocity in the vertical direction. Then, as a consequence of the conservation of vertical momentum flux, the vertical component of the jet velocity decays exponentially in the vertical direction. Utilizing these conditions as an assumed kinematic condition for the jet trajectory leads to a logarithmic trajectory for the jet in the region downstream from the potential core region. Verification is obtained using experimental data reported by others. (Author abstract)

16828 APTIC NO. 34491

Montague, Derek C. and F. S. Rowland

OXIRENE INTERMEDIATE IN THE REACTION OF SINGLET METHYLENE WITH CARBON MONOXIDE. *J. Am Chem. Soc., 93(21):5381-5387, Oct. 20, 1971. 30 refs.*

Singlet methylene from the photolysis of carbon-14 labeled ketene reacts with carbon monoxide with an isotopic carbon atom exchange to form carbon-14 monoxide. At higher pressures, the intermediate can be collisionally stabilized. This intermediate is presumably oxirene, although there is no evidence for a stabilized adduct other than (carbon-14)ketene. While CO is capable of suppressing the reactions of triplet methylene in mixed singlet/triplet systems, the collision efficiency of oxygen towards triplet methylene is 10,000 times greater than that of CO. The collision efficiency with CO of triplet methylene is substantially less than that of singlet methylene with CO. A simple kinetic analysis permits an estimate of 0.10 for the ratio of rate constants for reaction of carbon-14 singlet methylene with CO and with ketene. Approximately half of the carbon-14 methylene plus CO adducts are collisionally stabilized at 840 Torr of CO. (Author abstract modified)

16829 APTIC NO. 34623

Muehle, J.

STUDY OF PARTICLE TRAJECTORIES IN ROTARY FLOWS. PART I: THE INFLUENCE OF THE MOST IMPORTANT PARAMETERS. *(Untersuchung von Partikelbahnen in Drehstroemungen. Teil I: Ueber den Einfluss der wichtigsten Kennzahlen). Text in German. Chem.-Ing.-Tech., 43(21):1158-1167, 1971. 13 refs.*

The movement of spherical particles in flows with velocity distributions of rotational symmetry is calculated. Such movements are found in scrubbers and in solid, liquid, and gas separators. The velocity distribution of the fluid is assumed to be a simple rotary flow of the nature of a potential vortex. A constant axial velocity may be superimposed. The resistance of the particles is described by an empirical expression comprising both Stoke s and Newton s law. The first part deals particularly with the influence of the most important parameters on the course of the particle trajectories. They are determined by three parameters which are characterized by the diameter of the particles, the density of the fluid, the density of the particles, and the kinematic viscosity of the fluid. The particle trajectories for a vertical plane of rotation and different Archimedes numbers were calculated and are shown in a graph. The Archimedes number is of little importance at particle diameters of less than one mm.

16830 APTIC NO. 34352

Otsuka, Seinosuke and Yoshitaka Tatsuno

INTERACTIONS OF SO2 WITH METAL COMPLEXES. *(Esu o tu to kinzoku tai to no sogo sayo). Text in Japanese. Yuki Gosei Kagaku Kyokai-shi (J. Soc. Org. Syn. Chem.), 28(9):902-914, Sept. 1970. 92 refs.*

A theoretical study is presented of the formation of metal complexes by mutual catalytic interactions of sulfur dioxide and various metal complexes. The electronic structure of SO2 molecules is explained. As donor acceptor types of the SO2 complex, there are complexes with Lewis acids and with Lewis bases. With respect to transitory metals, the structures of several complexes and SO2 electron susceptibility are discussed. Insertion reactions of delta-alkyl metals, allyl, allenyl, and propargyl complexes are discussed. Desulfurization reactions of SO2 and interactions of SO2 complexes and oxygen are analyzed. In actual experiments, only few cases have succeeded in the formation of metal complexes by SO2 s catalytic reactions: the interaction of ethylene and SO2 in the presence of lead chloride at 70 F produces CH3CH2SO2CH2-CH double bond CHCH3. By theoretical analysis of structure, the copolymerization of olefin and SO2 is possible by a catalytic interaction of metal complexes. This reaction, which was previously brought out by a radical initiator may be made possible in experiments in the future.

16831 APTIC NO. 34390

Payzant, J. D., R. Yamdagni, and P. Kebarle

HYDRATION OF CN(-), NO2(-), NO3(-), AND OH(-) IN THE GAS PHASE. *Can. J. Chem., 49(20):3308-3314, Oct. 15, 1971. 23 refs.*

The temperature dependence of the equilibrium constant for the general reaction occurring in the gas phase of negatively charged ions of nitrate, nitrites, nitrogen trioxide, cyanide, and hydroxide was experimentally determined. The equilibrium constants for some of the hydrates of these ions and their total heats of hydration were calculated. Relative to the total hydration energies, the hydration interaction of the ions was larger than that of the halide ions. Based on an approximate linear correlation between the hydration interaction of negative ions and the heterolytic bond dissociation energy, independent estimates for the electron affinities of nitrogen dioxide and nitrogen trioxide could be obtained. (Author abstract modified)

16832 APTIC NO. 34833

Rissmann, Edwin F.

INFRARED SPECTROSCOPIC STUDY OF GAS-SOLID INTERACTIONS. REPORT NO. III. (FINAL REPORT). *General Technologies Corp., Reston, Va., Office of Air Programs Contract CPA 70-63, 77p., May 1971. 16 refs.*

NTIS: PB 201422

Using infrared spectroscopy in combination with electron microprobe studies, it has been possible to demonstrate reactions of impurities at high calcination temperatures with limestone and to show diffusion of some of these impurities or reaction products into pores and to bulk surfaces. Using the infrared method alone, new thin film cells have been developed and the groundwork has been laid for extending the analysis techniques developed to slurries. Two varieties of thin film infrared cells have been developed, using Irtran two as the window material, which possess better wear resistance than the silver chloride cells used in earlier work. Calibration curves for nitrate, nitrite, sulfate, and sulfite have been developed for three solvent systems. Infrared studies of deadburning have shown that reactions of silica and other impurities with lime and limestone do occur readily above 2300 F. (Author conclusions modified)

16833 APTIC NO. 34598

Scharber, S. R., Jr. and S. E. Webber

OPTICAL CONSTANTS OF SIMPLE MOLECULAR CRYSTALS. I. RESULTS FOR CO AND 02. *J. Chem. Phys., 55(8):3977-3985, Oct. 15, 1971. 44 refs. (Presented at the American Chemical Society, Southwest Regional Meeting, 25th, Tulsa, Okla., Dec. 4-5, 1969.)*

Reflection and transmission spectra of unannealed films of alpha-carbon monoxide and alpha-molecular oxygen at 20.4 K were obtained, and values for the optical constants and the real and imaginary part of the dielectric constant determined. The monochromator used was a McPherson Model 235 using the full width of the grating, and the light source was a McPherson Model 630 using an arc discharge through a low pressure of hydrogen. Reflectivity was measured by comparing the reflected beam intensity (20 deg angle of incidence) with the incident intensity point by point. The incident beam intensity was measured by pulling the sample out of the light path and rotating the photomultiplier around to intercept the beam. Transmission data were taken by comparing successive films of different thickness. The experimental technique and apparatus are described in detail. Oscillator strength of the fourth-positive transition group of alpha CO was estimated to be in the range 0.035 and 0.068, while the oscillator strength for the Schumann-Runge transition in alpha-02 was estimated to be between 0.22 and 0.35. (Author abstract modified)

16834 APTIC NO. 34838

Schramm, Eleanor C. and David W. Levi

TRANSMISSION OF SOLVENT VAPORS THROUGH TYVEK. *Picatinny Arsenal, Dover, N. J., Materials Engineering Lab., Army Proj. 1CO14501B13a, PA TR-4126, AMCMS code 5011.11.852, 78p., April 1971. 8 refs.*

NTIS, DDC:AD 722781

A simple cup method was used to measure the transmission of solvent vapors through Tyvek (spun-bonded polyethylene) sheets. While not giving absolute values, the method can be used to compare the transmission of a number of vapors under steady-state conditions. Measurements were made at three liquid levels of a single Tyvek sheet and at two levels for a sheet of double thickness. The results are presented in tables and graphs. For the 28 solvents tested, transmission appeared to be a linear function of vapor pressure. However, each class of solvents gave its own characteristic line, indicating some specific interaction between solvent and polymer. Vapor transmission was estimated by determining contributions from various chemical groups present in the solvents. A semilog plot of transmission versus numbers of carbon atoms was constructed for hydrocarbons. Other solvents with different functional groups were plotted on the same graph; the amount by which they needed to be shifted coincided with the hydrocarbon curve corresponding to the group contribution (permachor value). The method appears to give a useful prediction of vapor transmission.

16835 APTIC NO. 34764

Schroeder, William H. and Paul Urone

THERMAL AND PHOTOCHEMICAL REACTIONS OF SULFUR DIOXIDE IN AIR. *Preprint, American Chemical Society, Washington, D.C., Div of Water, Air and Waste Chemistry, p. 119-127, 1970. 12 refs. (Presented at the American Chemical Society, Division of Water, Air and Waste Chemistry, Chicago, Ill., Sept. 13-18, 1970.)*

Sulfur dioxide-air mixtures at 1000 ppm or less were prepared by injecting the appropriate amounts of sulfur with a syringe into the air stream being monitored. At concentration levels greater than 1000 ppm, SO2 was injected directly into flasks filled with air to atmospheric pressure. Mixtures were irradiated for controlled periods of time in a photochemical chamber reactor. SO2 was analyzed by gas chromatography and nitrogen dioxide, by infrared spectroscopy. The results of two experiments in which mixtures of 1000 ppm SO2 in dry air were stored in the absence of light for about one week showed that it is possible to store SO2 without any appreciable loss. The experimental results obtained at 50 and 90% relative humidity showed a somewhat higher than the observed rate in the absence of water, indicating some dependence of the photochemical oxidation rate on the moisture content of the air. Experiments with NO2-air mixtures showed a decrease of about 13% in the gaseous NO2 concentration after storage for two weeks. Irradiation of 1.50% NO2 in dry air for periods up to 48 hr caused only a slight observable decrease in the NO2 concentration. In experiments with a mixture of 1000 ppm SO2 and 1.50% NO2 in dry air stored in the dark for two and one-half hours, irradiated for 15 min, and stored in the dark, the SO2 concentration was stable during storage in the dark prior to irradiation. Irradiation of the mixture decreased the SO2 concentration. After irradiation, there is an induction period during which the SO2 concentration remains constant at the new level. At the end of the induction period, the SO2 concentration starts to decrease continuously, indicating the presence of a photochemically initiated dark reaction.

16836 APTIC NO. 34310

Shields, F. Douglas and Buford Anderson

MORE ON VIBRATIONAL RELAXATION IN SO2/AR MIXTURES. *J. Chem. Phys., 55(6):2636-2639, Sept. 15, 1971. 11 refs.*

A new system for making sound velocity and absorption measurements in gases has been constructed using capacitance transducers, resulting in a system having greater accuracy than that previously employed. Using this system and an improved method for correcting for the tube effect, the relaxation absorption has been measured in a mixture of 25% sulfur dioxide/75% argon to an accuracy sufficient to distinguish between the series and parallel relaxation schemes in SO2. The measurements favor the series process with energy passing through the bending mode into the stretching modes by vibration-vibration energy transfer. The effectiveness of SO2/Ar collisions in producing v-v exchanges is 0.05 of that of SO2/SO2 collisions. (Author abstract)

16837 APTIC NO. 35011

Shimizu, Takashi, Hiroshi Hara, Hiroshi Yanai, and Koji Shimada

CATALYTIC OXIDATION OF CARBON MONOXIDE ON SEMICONDUCTIVE BARIUM TITANATE. *(Handotai chitansan bariumu ni yoru issanka tanso no sesshokusanka). Text in Japanese. Kogyo Kagaku Zasshi (J. Chem. Soc. Japan), 74(11):2230-2234, Nov. 1971. 17 refs.*

For the purpose of clarifying the mechanism and speed of oxidation of carbon monoxide, experiments were conducted using semiconductive barium titanate. Measurements of the speed of catalytic adsorption of CO, oxygen, and the oxidation reaction speed of CO were taken. The initial adsorption speed showed relationships similar to Frundlich isotherm for both CO and 02, and adsorption activation temperatures were 3.8 kcal/mol, and 7.4 kcal/mol respectively. The adsorption quantity was twice as much for oxygen as for CO, and the reaction of CO oxidation took at least two patterns of speeds depending on the temperature. For more than 380 C temperature, the speed could be formulated. The surface reactions of adsorbed oxygen and CO progressed by rate-determining steps. Activation energy varied due to impure material contained, and yielded 11.7 kcal/mol for La0203-0.3, and 13.4 kcal/mol for La203-0.6.

16838 APTIC NO. 34643

Soo, S. L. and S. K. Tung

PIPE FLOW OF SUSPENSIONS IN TURBULENT FLUID. ELECTROSTATIC AND GRAVITY EFFECTS. *Appl. Sci. Res., vol. 24:83-97, June 1971. 10 refs.*

The general case of a fully developed pipe flow of a suspension in a turbulent fluid with electrically charged particles or with significant gravity effect, or both, and for any inclination of the pipe with the direction of gravity, is formulated. Parameters defining the state of motion are pipe flow Reynolds number, Froude number,electro diffusion number, diffusion response number, momentum transfer number, and particle Knudsen number. Comparison with experimental results is made for both gas-solid and liquid-solid suspensions. The gravity effect becomes significant in the case of large pipe diameters and large particle concentrations. (Author abstract modified)

16839 APTIC NO. 34309

Woodward, A. J. and Neville Jonathan

INFRARED SPECTRA OF NITRIC OXIDE ADSORBED ON EVAPORATED ALKALI HALIDE FILMS. *J. Phys. Chem., 75(19):2930-2935, 1971. 23 refs.*

Infrared spectra are reported for nitric oxide adsorbed at different surface coverages on high surface area films of evaporated sodium chloride, sodium bromide, sodium iodide, potassium chloride, and cesium chloride. Adsorption studies were made in the temperature range -145 to 150 deg, the spectra being recorded with a Grubb-Parsons GS2A grating spectrometer. The data are interpreted in terms of monomeric and dimeric species adsorbed on the surface planes and at the edges of the alkali halide crystallites. Possible adsorption sites and orientations of the adsorbate are discussed. The spectra provide support for the surface structures previously proposed for alkali halide films. (Author abstract)

EFFECTS-HUMAN HEALTH

16840 APTIC NO. 34667

Little (Arthur D.), Inc., Cambridge, Mass.

EVALUATION OF COMMUNITY ODOR EXPOSURE. *31p., 1971. 58 refs. (Report resulting from discussions and based on the working papers of a symposium sponsored by the Environmental Protection Agency, April 26-29, 1971.)*

NTIS: PB 204989

Discussions on community odor exposure during a symposium are summarized, based on papers and reports by the participants on human reactions to odors; empirical data on odor exposure from different sources; dose-response relationships; interactions between odor sources and environmental conditions; temporal patterns; and scientific bases for performance standards. Recommendations for basic and applied research are presented. Odorous compounds were defined as those materials whose most common adverse effect is the annoyance reaction caused by the odor itself. Human reactions to odors included disease states, annoyance reactions, social and economic reactions, physiological responses, and interference with positive reactions to nonambient odors. Sensory analysis techniques to determine odors from pulp mills and diesel exhaust are discussed.

16841 APTIC NO. 35039

Yokkaichi District Air Pollution Control Council (Japan)

FOLLOW-UP INVESTIGATION OF RECOGNIZED PATIENTS BY DISEASES RELATED TO AIR POLLUTION. *(Taikiosen ni kankeiaru nintei kanja no tsuiseki chosa). Text in Japanese. 17p., March 1970.*

An investigation of 344 patients with air pollution related diseases was carried out concerning the relationship between complaints of patients and concentrations of sulfur dioxide, asthmatic attacks during the night, symptoms connected with air pollution, the state of employment, and main complaints. In the Isozu district, patients complaints were in accord with concentrations of sulfur dioxide produced from autumn to winter. In the other districts, the relationship showed about the same tendency. Two-thirds of the patients had asthmatic attacks. About 22% used ordinary drugs for their attacks, but these drugs seemed to have a bad influence. There were various symptoms connected with air pollution. Many patients with epistaxis (nosebleed) were found in the Hashikita district. Half the patients continued to work as usual. A third felt pain but continued to work. There were no apparent reasons why remaining 10% stopped work. Patients mainly complained of medical treatment, economic problems, and mental pain. There were many troubles of family relations.

16842 APTIC NO. 35041

Ministry of Health and Welfare (Japan) and Osaka Prefectural Government (Japan)

REPORT ON THE EFFECT OF SMOKE AND DUST. *(Baien to eikyo chosa hokokusho. Showa 44 nendo ban). Text in Japanese. 85p., 1969.*

Environmental monitoring and medical examinations have been carried out since 1965 to study the effect of air pollution on the health of school children. The Fuku elementary school, located in the district of the worst environmental condition in Osaka City, the Ikeda elementary school in a residential area, and the Nishiura elementary school in a rural area were examined. Annual fluctuation of dust fall in the polluted area was higher than that in the non-polluted area. From the determination of sulfur oxides by the lead dioxide method, a polluted area showed an average value of 3.29 sulfur trioxide mg/day/100 sq cm and a non-polluted area showed 0.71 SO3 mg/day/100 sq cm. The amount of floating dust in a polluted area was twice more and four times more than that in a non-polluted area, measured by digital dust counter and high volume air sampler respectively. Metallic content, such as lead, nickel, vanadium, copper, zinc, and cobalt, was remarkably high at a polluted area. Medical examinations were carried out three times a year. According to the questionnaire, subjective symptoms of sore throat, headache, and cough or sputum were frequently reported at the polluted school. Forced vital capacity and timed vital capacity were low at schools in the polluted area according to the pulmonary function test by vitalor.

16843 APTIC NO. 34682

Adamo, Mario

TOXICITY OF MERCURY VAPORS UNDER VARIOUS ENVIRONMENTAL CONDITIONS. *(La tossicita dei vapori di mercurio in deverse condizioni ambientali). Text in Italian. Rass. Med. Ind., vol. 10:684-690, 1939. 7 refs.*

Guinea pigs kept in confined and humid environments, and subjected to inhalation of mercury vapor for two hours daily, quickly (after three-seven hours of treatment) grew sick and died. Toxicity was practically absent in guinea pigs subjected to inhalation of Hg vapors in dry and well ventilated environments, for as long as 50 hours. The results suggest that the fast toxic action exerted by the Hg vapors when inhaled in humid environments is actually due to the indirect effect of carbon monoxide. The latter, being soluble in water, is easily absorbed by the animals; accordingly, it induces respiratory stimulation and a subsequent fast rate of absorption of the agent being tested. Work areas contaminated with Hg vapors should be well ventilated and dry in order to protect the health of the workers.

16844 APTIC NO. 34945

Alekseyeva, O. G.

EXPERIMENTAL STUDY OF THE INFLUENCE OF PULMONARY NUCLEOPROTEIN SENSITIZATION OF THE INTENSITY OF THE CURTIS SKIN TEST IN BERYLLIOSIS. *(Eksperimental noye izucheniye vliyaniya sensibilizatsii nukleoproteidami legkikh na vyrazhennost kozhnogo testa Kurtisa pri berillioze). Academy of medical Sciences, Moscow (USSR), Inst. of Labor Hygiene and Occupational Diseases, 1967 (?). 3 refs. Translated from Russian. Leo Kanner Assoc., Redwood City, Calif., 9p., March 1971.*

Sensitization of guinea pigs with nucleoproteins derived from the lungs of rats with experimental berylliosis specifically increases the intensity of the intradermal Curtis test with 2.5-3 micrograms of beryllium chloride, induced through allergy to the complex of beryllium plus auto-protein. The greatest activating effect is produced by a combination of delayed hypersensitivity to both antigens. This suggests that the Curtis test in berylliosis patients is related not only to the sensitization by the beryllium plus protein complex, but also to the influence of auto-allergic processes. (Author summary modified)

16845 APTIC NO. 34862

Allison, A. C. and G. R. Paton

CHROMOSOME DAMAGE IN HUMAN DIPLOID CELLS FOLLOWING ACTIVATION OF LYSOMAL ENZYMES. *Nature (London), 207(5002):1170-1173, Sept. 11, 1965. 24 refs.*

A method of selective activation of lysomal enzymes was used to test the hypothesis that deoxyribonuclease (DNase) or other enzymes liberated from cytoplasmic organellos known as lysosomes might be able to enter the nucleus and produce structural alterations in chromosomes. The method involved adding the photosensitizing agents neutral red, anthracene, acradine, and acridine organs to human diploid cells, exposing the cells to light, and examining the intracellular distribution of the photosensitizing agents by direct or fluorescence microscopy. The activation technique has the advantage that damage to lysosomes, with release of the enzymes they contain, is achieved without direct damage to the nucleus or other cytoplasmic constituents. The number of chromatid and chromosome breaks was clearly higher in photosensitized cells than in control; the primary photosensitizing effect was on the lysosomes. None of the photosensitizing agents produced breads in the absence of light. While the results appear to indicate that DNase released from lysosomes can break the DNA which is the backbone of the uncoiled interphase chromatid, direct evidence that the enzyme enters the nucleus will depend on further experiments. Enzyme activation could represent an important contributory mechanism in chromosome damage caused by chemicals and radiation, and lysosomal damage may play a part in carcinogenesis.

16846 APTIC NO. 34594

Amdur, Mary O.

AEROSOLS FORMED BY OXIDATION OF SULFUR DIOXIDE. *Arch. Environ. Health, 23(6):459-468, Dec. 1971. 27 refs.*

Literature relating to the toxicology of sulfuric acid and particulate sulfates is reviewed. These materials, which have a greater irritant potency than sulfur dioxide, may be formed in the atmosphere by oxidation of sulfur dioxide. Thus, air quality standards for sulfur dioxide must take into account the toxicology of these oxidation products. The particle size of the particulate oxidation products is of extreme importance. Data on concentration alone are insufficient to predict irritant potency. The most important size range is at the submicron level. Data on animal experiments, including the criteria of mortality, pathological findings in the lung, and studies utilizing altered pulmonary function are discussed. However, additional data are needed on exposure of human subjects. (Author abstract modified)

16847 APTIC NO. 34758

Amdur, Mary O.

THE PHYSIOLOGICAL RESPONSE OF GUINEA PIGS TO ATMOSPHERIC POLLUTANTS. *Intern. J. Air Pollution, vol. 1:170-183, 1959. 17 refs.*

Changes in the mechanical behavior of the lungs were produced by 1 hr exposure of guinea pigs to low concentrations of irritant air pollutants. Sulfur dioxide, acetic acid, formaldehyde, formic acid, and 0.8 micron sulfuric acid produced bronchial constriction, while 2.5 microns sulfuric acid resulted in obstruction of some of the larger air passages. Extension of the exposure time indicated that the response to SO2 continued to increase during a 3-hr exposure, whereas prolonging the formaldehyde exposure to 4 hr indicated that the maximum response was produced in 1 hr. For SO2, acetic acid, and formaldehyde the response was greater when the gases were breathed through a tracheal cannula, thus by-passing the scrubbing effect of the upper respiratory tract. Using mixtures of SO2 and H2SO4 mist, a synergistic toxic action was observed when the H2SO4 particle size was 0.8 micron but not when 2.5-micron H2SO4 was used. When the four irritant gases were studied in combination with 10 mg/cu m sodium chloride of 0.04 micron diameter, which was itself without effect on the animals, the response to SO2 and to formaldehyde was potentiated but the response to acetic and formic acids was unchanged. The aerosol, however, prolonged the response after termination of the exposure in the case of all four gases. The response to the combination of formaldehyde plus aerosol was greater than the response to the gas alone breathed through a tracheal cannula. The presence of the tracheal cannula used with the gas-aerosol mixture produced an increase exactly accounted for on the basis of the gas alone. At a given concentration of formaldehyde the response produced varied with the aerosol concentration. The experiments indicated that the increase of toxicity of a gas-aerosol mixture can be definitely related to the aerosol entity. (Author abstract modified)

16848 APTIC NO. 34708

Anderson, Donald O.

THE EFFECTS OF AIR CONTAMINATION ON HEALTH: PART I. *Can. Med. Assoc. J., vol. 97:528-536, Sept. 2, 1967. 72 refs.*

The fact that disease is readily produced by personal and occupational pollution has hindered productive epidemiological investigations of the health hazard of air pollution. However, even in the absence of respiratory symptoms, functional, changes in the lung have been observed that were in the direction of an air pollution effect, and which were shown by statistical manipulation to be not the result of age, body build, or smoking habits. Further productive research will come from studies incorporating these and other lung function tests in the survey procedure. Studies of acute air pollution episodes have been productive and indicate that air pollution can be lethal when present in conjunction with certain meteorological variables. Of urban variables, smoke is the most important one currently being measured and the only one showing a high correlation with all excess mortality and excess bronchic mortality. Correlation coefficients between mortality and bronchitis indices and smoke and sulfur dioxide are presented. Studies in New York, London, and elsewhere are summarized and criteria for epidemiological investigations are outlined.

16849 APTIC NO. 34621

Bittersohl, G.

EXPOSURE TESTS FOR EVALUATION OF THE FITNESS. *(Die Durchfuehrung von Expositionstests fuer die Beurteilung der Tauglichkeit). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 17(10):727-730, Oct. 1971.*

Exposure tests are necessary for determination of the fitness of workers operating in a polluted surrounding. They have even greater importance nowadays, since atmospheric pollution may have already affected the worker before he starts his work. Urine samples are of lesser value, since the collection of a 24-hour sample is hardly feasible in practice. Moreover, for many pollutants, such as mercury, no direct relationship between discharge quantity and blood or organ level exists. For many pollutants the examination of the saliva is of importance, such as bromides. Many pollutants are discharged again by expiration, for example, gases or solvents. The analysis of the expired air is still in a trial state. Measuring the carbon monoxide concentration in the expired air by a breathing bag, test tube, or chemical and physical methods seems to be promising. The best information is gained by analysis of body fluids and organs, such as blood and serum. For metals and metalloids, hair and finger nails are important storage places. The most accurate method is the CO determination according to the Uras principle. Of great value are tests which confirm the reaction of an organism with the pollutants, such as the delta-aminolaevulinic acid discharge in the urine and methaemoglin formation.

16850 APTIC NO. 34854

Bouhuys, A.

RECENT APPLICATIONS OF VOLUME DISPLACEMENT BODY PLETHYSMOGRAPHS. *Progr. Resp. Res., vol. 4:24-38, 1969. 19 refs. (Presented at the International Symposium on Body Plethysmography, Nijmegen, Netherlands, 1968.)*

A volume displacement body plethysmograph with a 10-liter waterless spirometer was used for several tests of mechanical aspects of lung function. These include determination of total lung capacity and its subdivisions, airway conductance at different lung volumes, and maximum expiratory flow-volume curves. The electronic components include a weighting circuit to correct the spirometer response for plethysmographic pressure changes and a Bernstein-Shepard zeroing circuit to obtain a low and a high resolution volume signal display. In some conditions, changes in bronchomotor tone may lead to changes of airway conductance with little change of maximum flow rates. In other conditions, and increase in bronchomotor tone may cause decreases of maximum flow rates with little decrease of conductance. To assess such conditions, the conductance and maximum flow rates must be measured. Both measurements should be studied as a function of lung volume; the volume displacement body plethysmograph allows the use of an absolute volume reference (thoracic gas volume) for both. (Author summary modified)

16851 APTIC NO. 34397

Bourbon, P.

THE EFFECT OF AIR POLLUTION ON HEALTH. *(Effets de la pollution atmospherique sur la sante). Text in French. Prod. Probl. Pharm., 26(8):549-557, Aug./Sept. 1971. 7 refs.*

The evolutions and origins of air pollution, the effects of air pollution on human health to determine toxic concentrations and tolerances, experiments with laboratory animals, and various epidemiological researches are reviewed with respect to carcinogenic substances, respiratory diseases due to acid smogs, carbon monoxide, and irritation from oxidants. Toxic norms established in the USSR, Germany, the United States, England, Sweden, France, and by international agencies are discussed.

16852 APTIC NO. 34841

Campbell, Kirby I., William M. Busey, Niell K. Weaver, James A. Taylor, and Alexis A. Krumm

BIOLOGICAL EFFECTS IN ANIMALS CHRONICALLY EXPOSED TO LEAD CHLOROBROMIDE ATMOSPHERES. *Preprint, Hazleton Labs., Inc., Vienna, Va., Inhalation Toxicology Dept. and Environmental Protection Agency, Cincinnati, Ohio, Toxicology Program, Coordinating Research Council Contract CAPM-6-68, 20p., 1971. 20 refs.*

Groups of nine cynomolgus monkeys were exposed virtually continuously for 104 weeks, in steel and glass inhalation chambers, to atmospheres characterized by respirable lead chlorobromide particulate alone and in simple combination with nitrogen dioxide, carbon monoxide, or sulfur dioxide. Nominal concentrations were: PbClBr at 0.6 mg/cu m, NO2 at 0.5 ppm, CO at 67.6 ppm, and SO2 at 10 ppm. A matching group, exposed only to filtered room air, served as controls. Various clinical and physiological determinations were performed prior to and throughout the exposure period, and histopathologic evaluations were conducted terminally at sacrifice. Compared to controls, all groups exposed to atmospheres containing PbClBr alone or in combination exhibited increased blood lead levels occurring early and sustaining throughout the exposure; corresponding elevations of urinary coproporphyrins and delta-aminolevulinic acid; reduced erythrocyte osmotic fragility; and nephropathy characterized by dilatation and epithelial cell degeneration in the proximal convoluted tubules, with cytoplasmic vacuolation, nuclear vesiculation, intranuclear inclusions, and disrupted borders. Elevated terminal blood levels and slightly increased renal pathology were also observed in corresponding groups of rats similarly exposed for 52 weeks in the same atmosphere. (Author summary)

16853 APTIC NO. 34936

Chebotarev, O. V.

INDUSTRIAL POLLUTION OF THE ATMOSPHERE. *Zh. Vses. Khim. Obshchestva im. D. I. Mendeleeva, 15(5):482-492, Oct. 9, 1970. 40 refs. Translated from Rus-*

sian in: Atmospheric Studies At Chemical Enterprises -- USSR, p. 1-22, March 9, 1971. Joint Publications Research Service, Washington, D. C.

NTIS: JPRS-52566

One of the basic problems of industrial toxicology is establishing the maximum amount of harmful industrial agents not causing pathological changes or diseases in the presence of daily effects for the duration of the working day and unlimited work time. In the USSR, maximum permissible concentrations (MPC) have been established for approximately 400 chemical compounds encountered in production facilities. Values for a number of compounds are shown together with MPC values for the air of populated areas where chemical enterprises are located. As a rule, atmospheric values are two or three orders lower than for the air of production facilities. The most toxic industrial poisons are those that affect enzymes regulating vital activity and energy metabolism processes. Ways in which enzyme activity is impaired are discussed with special reference to the nervous system. Control of pollution in a chemical plant requires the monitoring of air in the facility; the monitoring of seals in the technological process line; and the monitoring of process conditions. The monitoring of air is the most complicated problem and basic requirements are given. Sensitivities and range of application of various types of gas analyzers ar tabulated.

16854 APTIC NO. 34522

Corn, Morton

DOSE TO THE RESPIRATORY TRACT FROM PERSONAL, OCCUPATIONAL AND COMMUNITY AIR POLLUTANTS. *Environ. Letters, 1(1):29-39, 1971. 8 refs. (Presented at the Pennsylvania Tuberculosis and Health Society, Annual Meeting, 78th, Pittsburgh, Pa., April 29, 1970.)*

The doses to the respiratory tract by urban, occupational, and personal pollutants were calculated by assuming pollutant concentration in air equivalent to air quality standards, threshold limit values, and reported cigarette smoke concentrations, respectively. The dose of inhaled agent is the product of the concentration and the time of exposure. From a physico-chemical stand-point the dose from cigarette smoking is an overwhelming challenge to the respiratory tract in comparison to challenges presented by occupational exposures and community air pollution exposures when the latter two are at or even above prescribed guidelines, respectively. Assumptions and results of calculations are presented. (Author abstract modified)

16855 APTIC NO. 34346

Cremer, H.-D. and W. Buettner

ARGUMENTS FOR AND ARGUMENTS AGAINST FLUORIDATION OF DRINKING WATER. *(Argumente und Gegenargumente zur Fluoridierung des Trinkwassers). Text in German. Oeffentl. Gesundheitswesen (Stuttgart), 33(4):166-183, 1971. 57 refs.*

In industrialized countries, the fluoride emissions in industrial centers may in some cases be so high, e.g., as in the city of Graz, that the atmospheric concentration to which the population is exposed is as high as the optimum fluoride intake for prevention of caries. A chronic fluoride intoxication at simultaneous F-emission and drinking water fluoridation can be negated with certainty, however. In industrial centers with fluoride emissions, the fluoride content of the air and the fluoride elimination in the urine must be measured before the drinking water is fluoridated to avoid the occurrence of spotted dental enamel. In the vicinity of factories emitting fluoride containing waste gases and fly dust, F-concentrations between 0.57 to 3.80 mg F/kg were measured. In the vicinity of hydrofluoric acid factories, an average F-concentration of 0.22 mg/l was found in the milk. High F-emissions by such plants must be avoided. In areas where the F-emission has been limited, drinking water fluoridation is possible.

16856 APTIC NO. 34453

David, A.

HEMOLYSIS CAUSED BY FIBROGENOUS DUSTS AS A MODEL OF CELL DAMAGE. *(Hemolyza vlivem fibrogennich prachu jako model poskozeni bunek). Text in Czech. Pracovni Lekar. (Prague), 23(7):250-253, July 1971. 24 refs.*

Colloidal silica, quartz, and asbestos dust cause hemolysis of red blood corpuscles suspended in a physiological solution; this phenomenon can serve as a model for studying the influence of fibrogenous dust on the intracellular membranes, which is of particular interest in connection with the pathogenesis of silicosis. In most cases, the test solution used for the study of hemolytic effects contains veronal. The extent of hemolysis is determined by photocolorimetry after centrifugation. Hemolysis can not be brought about in a suspension of erythrocytes in a solution in which albumen is present, which means that the dust would not effect hemolysis with samples of complete blood. Microscopicobservation shows that, after the introduction of silica dust, the dust particles settle on the surface of the erythrocytes, and the hemolysis proper takes place in two phases. During the first phase, which lasts a few minutes, the erythrocytes grow, whereas in the second phase, which takes only a few seconds, they become transparent and eventually invisible. The speed and intensity of the hemolysis generally increases with the size of the dust particles, and decreases with the lowering of temperature. In addition to silica and asbestos, hemolytic effects are, to a lesser degree, also brought about by aluminum oxide, coal dust, talc, glass dust, carborundum, and other materials in dust form. Effective substances for reducing the hemolytic effect of both silica and asbestos are, primarily, blood serum and hemoglobin, also polyvinyl pyridine-N-oxide in the case of silica, and a copolymer of pyran in case of asbestos.

16857 APTIC NO. 34875

Dews, P. B.

DRUGS IN PSYCHOLOGY. A COMMENTARY ON TRAVIS THOMPSON AND CHARLES R. SCHUSTER S BEHAVIORAL PHARMACOLOGY. *J. Exp. Anal. Behav., 13(3):395-406, May 1970. 15 refs.*

The effects of drugs on motor capabilities, sensory functions, motivation, and learning are considered against the background provided from the first textbook devoted to Behavioral Pharmacology. Environmental determinants of drug effects, effects of drugs, selectivity, susceptibility, and mechanisms are mentioned. It is not surprising that the effects of drugs on behavior are grossly affected by the environmental influences that determine the rate of responding; for this reason alone, environmental influences are quantitatively much more predominant in determining behavioral effects of drugs than physiological effects of drugs.

16858 APTIC NO. 34950

Druyan, R. and Birgitta Haeger-Aronsen

AMINOACETONE EXCRETION IN PORPHYRIAS AND IN CHRONIC LEAD INTOXICATION. *Scand. J. Clin. Lab. Invest., vol. 16:498-502, 1964. 14 refs.*

Previous studies suggested that aminoacetone (AA) and delta-aminolevulinic acid (ALA) share a common synthetic pathway in various biologic systems, and AA was reported as absent from urine of patients with acute intermittent porphyria (AIP). Using a column chromatographic method which separates AA from ALA, aminoketone excretion was studied among patients with AIP, porphyria variegata, porphyria cutanea tarda, and chronic lead intoxication. Fresh urine samples were analyzed immediately for creatinine, uroporphyrin, coproporphyrin, and aminoketones. In each instance, ALA excretion was increased; conversely AA excretion was entirely normal in all patients studied. (Author summary modified)

16859 APTIC NO. 34597

Dyment, Paul G., Leon M. Hebertson, Edward D. Gomes, J. S. Wiseman, and R. W. Hornabrook

ABSENCE OF POLYCHLORINATED BIPHENYLS IN HUMAN MILK AND SERUM FROM TEXAS AND HUMAN MILK FROM NEW GUINEA. *Bull. Environ. Contamination Toxicol., 6(6):532-534, Nov./Dec. 1971. 6 refs.*

Seventy-nine lactating women from New Guinea and Texas had their breast milk assayed for the presence of polychlorinated biphenyls, a widespread industrial pollutant of the ecosystem. Twenty-eight of these women also had serum samples assayed for polychlorinated biphenyls. Their total absence from these samples would suggest that the polychlorinated biphenyls are not yet significantly contaminating humans. These chemicals are used in industry as plasticizers and in the manufacture of electrical insulators, varnishes, paints, lubricants, heat transfer fluids, and other products, such as insecticides. (Author summary modified)

16860 APTIC NO. 34411

Fallentin, Borge, Anne Fogh, and Jorgen Frost

POISONING WITH NITROUS FUMES. *(Forgiftning med nitrose gasser). Text in Danish. Ugeskr. Laeg., 133(25):1225-1230, June 25, 1971. 22 refs.*

Poisoning by exposure to nitrous fumes which mainly consist of nitrogen dioxide, is examined with respect to toxicity, maximum allowable concentrations, sources of emission, risks of occupational exposure, and treatments. Nitrous fumes have only a slight irritant effect on the mucous membranes of the upper respiratory tract, but exert their full effect in the alveoli, resulting in fatal pulmonary edema. In typical cases, pulmonary edema occurs after a latent period of some hours but seldom later than 24 hours after exposure.

16861 APTIC NO. 34573

Felkel, H., R. Feuereisl, A. Tomanek, Zb. Janour, and O. Mazur

THE DETERMINATION OF THE TYPE OF FLOW IN THE TRACHEA AND THE BRONCHOSCOPICALLY ACCESSIBLE BRONCHIAL TREE. *(Messungen der Luftstroemung im Bronchialsystem beim gesunden Menschen). Text in German. Pneumonol. (Berlin), 146(2):120-125, Oct. 1971. 13 refs.*

For determination of the air flow in the bronchial system of healthy humans, a constant temperature anemometer was used. It consisted of a probe accommodating a tungsten wire with a diameter of 0.005 mm and a length of 2.0 mm. The flowing air cools the heated wire, and thus causes a change of the ohmic resistance. The probe was installed in the distal opening of the brochoscope. With the apparatus only measurements during expiration were feasible. Twenty five healthy persons were examined. The flow in the trachea and bronchi is a turbulent one, which from a physiological point of view is of advantage since the gas mixing, humidification, warming up and the elimination of particulate pollutants in the air is promoted.

16862 APTIC NO. 34394

Frank, R., J. P. Flesch, and J. D. Brain

EFFECT OF OZONE ON ELASTIC BEHAVIOR OF EXCISED LUNGS OF DOGS. *Environ. Res., vol. 4:343-354, Oct. 1971. 21 refs.*

The effects of ozone on the elastic behavior of the lungs in the absence of intraalveolar edema were investigated. The static deflation volume-pressure behavior of excised paired lobes of lungs in dogs before and after ventilation with either air or ozone was measured. The lobes exposed to ozone determined a slight increase in recoiling force at intermediate and large volumes and a more rapid fall in dynamic compliance compared with lobes exposed to air. Lobes exposed to air or ozone during ventilation characterized by a large tidal volume, slow frequency, and end-expiratory collapse established similar impairment of alveolar stability and, following continuous inflation for several hours, similar degrees of recovery. (Author abstract modified)

16863 APTIC NO. 34701

Freeman, Ronald

CHRONIC LEAD POISONING IN CHILDREN: A REVIEW OF 90 CHILDREN DIAGNOSED IN SYDNEY, 1948-1967. *Med. J. Australia (Sydney), vol. 1:640-647, March 28, 1970. 21 refs.*

Based on a study of case histories, 90 children admitted to two Sydney hospitals between 1948 and 1967 had chronic lead poisoning. Forty of the children were treated in the three-year period 1963-1967. Most of the children were poisoned after ingesting lead-based paint peeling off the walls of their homes and most appeared to develop symptoms in the hot summer months. The incidence was highest in three of the older municipalities, but individual cases came from many other parts of Sydney, suggesting that the hazard is quite widespread. In a few cases, the only source of lead was toys. Legislation restricting the use of lead paint in New South Wales is urged.

16864 APTIC NO. 34832

Fullerton, Pamela M.

CHRONIC PERIPHERAL NEUROPATHY PRODUCED BY LEAD POISONING IN GUINEA-PIGS. *J. Neuropathol. Exp. Neurol., vol. 25:214-236, 1966. 38 refs.*

Seventy-two guinea pigs were poisoned with repeated doses of intragastric lead acetate. During poisoning, growth was inhibited in young guinea pigs; in both young and adult animals, weight loss, anemia, and convulsions were seen. Only nine animals developed paralysis of the hind limbs, which was usually mild. Motor nerve conduction velocity was estimated in 40 animals, and was reduced in 17 of them. In some cases, maximal velocity fell from the normal range of 40 to 60 m/sec to less than 20 m/sec. In a few, single motor nerve fibers velocities as low as eight m/sec were recorded. The peripheral nerves were examined histologically in 52 animals and abnormalities were found in 31. The most common pathological change was a mixture of segmental demyelination and axonal degeneration. In eight animals, only segmental demyelination was found, and in five animals axonal degeneration was the sole finding. Markedly reduced conduction velocity was only seen in those animals in which segmental demyelination was present.

16865 APTIC NO. 34998

Galston, Arthur W.

SOME IMPLICATIONS OF THE WIDESPREAD USE OF HERBICIDES. *BioScience, 21(17):891-892, Sept. 1, 1971. 6 refs.*

Although chemical weed killers were introduced into agriculture only after World War II, it is now estimated that about 181,818.2 MT of various herbicides, worth more than one billion dollars per year, are used in agriculture in the United States alone. Among the herbicides employed are the phenoxyacetic acids, including 2,4-D and 2,4,5-T, various substituted triazines, substituted ureas and uracils, substituted benzoic acids, cacodylic acid, picloram, and a large variety of other compounds. In recent years, it has become clear that some of the techniques formerly employed to assess the toxicology of herbicides and other pesticides are incomplete at best and seriously deficient at worst. Late in 1969 it became clear that some samples of 2,4,5-T and possibly also of 2,4-D were teratogenic to mice and rats. Among the abnormalities induced were cleft palate, cystic kidneys, blindness, amencephaly, and death. Much evidence now seems to indicate that impurities of the dioxin type which arise during high temperature conditions in the synthesis of 2,4,5-T may, in fact, be the toxic agents. The massive defoliation campaign in Vietnam has led to research into the effects of herbicides on humans.

16866 APTIC NO. 34649

Gillette, Robert

LEAD IN THE AIR: INDUSTRY WEIGHT ON ACADEMY PANEL CHALLENGED. *Science, 174(4011):800-802, Nov. 19, 1971.*

A major report on the health effects of airborne lead, released by the National Academy of Sciences in September 1971, has become the focus of a controversy over the academy s use of industry employees on its advisory panels to the Environmental Protection Agency. Although the panel noted that some groups of workers and children in inner-city neighborhoods might potentially be at risk, it found that the amount of lead in the air of most major cities has not changed greatly in the past 15 years. Environmental Protection Agency officials, who had hoped that the report would furnish the scientific underpinnings for a national air quality standard to control lead (which would require evidence of a danger to health or welfare), showed considerably less exuberance than the lead industry and gasoline manufacturers. During their service on the panel, four of the eighteen authors of the report were employed either by the E. I. Dupont de Nemours Company or by the Ethyl Corporation, which together produce most of the approximately 260,000 tons of lead additives burned each year in the United States. Certain data which the panel cited was also released by an industry advisory group.

16867 APTIC NO. 34723

Gladkova, E. V.

DIFFUSIBILITY OF THE LUNGS IN DUST-INDUCED PATHOLOGY OF THE BRONCHO-PULMONARY SYSTEM IN WORKERS OF MACHINE-BUILDING AND METAL-WORKING INDUSTRIES. *(Diffuzionnaya sposobnost legkikh pri pylevoy patologii bronkho legochnogo apparata u rabochikh mashinostroitelnoy i metalloobrabatyvayushchey promyshlennosti). Text in Russian. Gigiena Truda i Prof. Zabolevaniya, 15(8):38-40, Aug. 1971. 8 refs.*

The pulmonary diffusion capacity of 110 adult male workers involved in machine building and metal processing industries and affected by dust-induced diseases of the respiratory tract was investigated. No considerable decrease in pulmonary diffusion capacity was found in workers affected by pneumoconiosis. The alterations of this function were more severe in patients with pneumoconiosis associated with chronic bronchitis as well as in patients affected by dust-induced chronic bronchitis only. This indicates the pathogenic role of chronic dust-induced bronchitis in the alteration of the pulmonary diffusion capacity. The diffusion capacity of the lung decreased with the increase of respiratoratory insufficiency. The alterations of the pulmonary diffusion capacity were reversible according to dynamic investigations.

16868 APTIC NO. 34720

Gokina, M. S.

MYOCARDIAL CONTRACTILE FUNCTION IN WORKERS EXPOSED TO PROLONGED ACTION OF SMALL CARBON MONOXIDE CONCENTRATIONS. *(O sokratitelnoy sposobnosti miokarda u rabochikh, podvergayushchiksya dlitelnomu vozdeystviyu malykh kontsentratsiy okisi ogleroda). Text in Russian. Vrachebnoe delo (Kiev), no. 8:130-132, 1971.*

To reveal impairment of the myocardial contractile function in workers chronically exposed to carbon monoxide, polycardiographic analysis of the left ventricle systolic phase, using the nitroglycerine test, was carried out. Two male groups 20 to 45 years old, one consisting of 76 workers involved in the compression shop of an ammonia producing plant and exposed to annual average of 11 to 78 mg/cu m. CO concentrations for eight hours daily, and another group of 45 workers subjected to no CO exposure were investigated. The asynchronous contraction phase varied between 0.06 and 0.07 sec in the group exposed to CO and was 0.07 sec. in the control group. This phase was significantly increased two minutes following nitroglycerine administration in workers who had been exposed to CO for more than six years. The phase of isometric contraction ranged between 0.03 and 0.05 sec in the CO-affected group and constituted 0.04 sec in the control group, before nitrogycerin intake. This phase increased two and 15 min following nitroglycerin intake in workers who had been exposed for less than five years to CO. Blumberg s mechanical coefficient ranged between 2.4 and 2.6 in the first group and constituted 2.4 in the control group; it decreased in both groups following nitroglycerine intake. The 0.01 sec increase of the isometric contraction, 15 min following nitroglycerine intake in workers who had been exposed for less than five years to CO, indicates a decrease in the contractile capacity of the myocardium. The alterations of the left ventricle systolic phases in workers who had been exposed to CO for more than 11 years indicate the noxious effect of CO upon the myocardial contractile capacity.

16869 APTIC NO. 34836

Goyer, Robert A., Phillip May, Maxine M. Cates, and Martin R. Krigman

LEAD AND PROTEIN CONTENT OF ISOLATED INTRANUCLEAR INCLUSION BODIES FROM KIDNEYS OF LEAD-POISONED RATS. *Lab. Invest., 22(3):245-251, March 1970. 26 refs.*

In lead poisoning, nuclear inclusion bodies in renal tubular lining cells are shown to be composed of a lead-protein complex. The inclusions may be isolated for ultrastructural and biochemical study by the sonication of isolated nuclei and differential centrifugation. The morphologic integrity of the inclusions remains intact throughout the isolation procedure. The fine structure of the inclusions consists of a dense central core and an outer fibrillary zone. This ultrastructural appearance is altered by digestion with a proteolytic enzyme. Chemical analysis of the inclusions indicates a relatively constant lead-protein ratio, suggesting an orderly binding of lead by inclusion protein. The inclusion body may, therefore, function as a store or depot for intracellular lead. (Author abstract)

16870 APTIC NO. 34681

Griffiths, B. W. and R. Brunet

ISOLATION OF A BASIC PROTEIN ANTIGEN OF LOW RAGWEED POLLEN. *Can. J. Biochem., 49(3):396-400, 1971. 10 refs.*

A fractionation method was developed for the preparation of a basic protein antigen (BPA-R) from ragweed pollen. This antigen possesses potent allergenic activity. It is homogeneous by gel filtration on Sephadex G-100 and carboxymethyl-Sephadex chromatography. By the former method, the molecular weight of the BPA-R appears to be distinct from several other highly purified antigens currently isolated from ragweed pollen. The BPA-R and AgE (a highly purified acidic protein antufen) when tested together in Ouchterlony analysis displayed reactions of typical partial immunological identity with rabbit anti-weed sera which were produced by hyperimmunization utilizing complete Freund s adjuvant. In contrast rabbit antisera, produced by a shorter schedule with BPA-R (using incomplete Freund s adjuvant), failed to react by Ouchterlony test with the AgE but reacted strongly with the BPA-R. Further immunological as well as chemical studies will be necessary to elucidate the antigenic relationship between these moieties. (Author abstract)

16871 APTIC NO. 34436

Hardy, Harriet L., Richard I. Chamberlain, Clarence C. Maloof, George W. Boylen, Jr., and Mary C. Howell

LEAD AS AN ENVIRONMENTAL POISON. Clin. Pharmacol. Therap., 12(6):982-1002, Nov./Dec. 1971. 86 refs.

Sources of potential toxic body burden of lead were investigated and, to assess current body burden in and around a city (Boston), a number of assays were made of hair, urine, and postmortem samples. Additional studies were undertaken with chelating agents in an attempt to develop base-line data with which to assess low-level harmful lead effect. Finally, techniques used in evaluating occupational illness were employed in field trips to homes and neighborhoods of a few patients with proven lead poisoning. Soil samples in such neighborhoods contained lead in quantities sufficient to cause lead poisoning if eaten by children with pica. The lead concentration in soil was blamed in equal part on fallout from gasoline engine exhaust and on the washing of lead into the soil from exterior paint used on buildings. Two of 12 children with definite neurological disabilities had definetely elevated hair lead values (i.e., higher than the 25 ppm base line derived from analyses of hair samples from MIT students). Oral administration of pencillamine resulted in a marked increase in urinary lead excretion in children with lead poisoning without a corresponding decrease in fecal lead. Legislation banning the use of lead paint and leaded gasoline is urged and a screening program is proposed to identify those who have been poisoned by lead or risk poisoning. Six research needs of screening programs are enumerated. Acute and chronic poisoning are discussed.

16872 APTIC NO. 34749

Hattori, S., R. Tateishi, and Y. Morimura

INFLUENCES OF AIR POLLUTION ON HUMAN LUNGS - A PATHOLOGICAL STUDY. *(Taiki osen no jinpai ni oyobosu eikyo - Byorigakuteki chosa). Text in Japanese. Naika, 21(5):823-829, May 1968. 20 refs.*

Autopsies were carried out on lungs of 468 cadavers (20 years or older at death) and compared with representative cases of carbon deposit in lungs and pulmonary emphysema centering around lobules. The carbon deposit increased with the age, occurred more among inhabitants of polluted areas than those of non-polluted areas, occurred more among men than women, was prevalent among workers inhaling various dust particles (besides coal miners, stone masons, rice merchants, and lumber yard workers), and occurred more among smokers than nonsmokers. Since all forms of particulates and gases become factors in causing pulmonary emphysema, air pollution may be considered to be closely connected with this disease. In examining sizes of bronchial glands, mucous glands, peripheral bronchi goblet cells, and pavement epithelium of bronchial surface, hypertrophy of mucous glands occurred more with increase in age, 29.[illegible]% among the inhabitants of polluted areas; and 17.4% among the inhabitants of non-polluted areas. Pavement epithelium appeared frequently among the citizens who inhaled much SO2, though only 13 cases were studied among 274 test cases. It was concluded that the influence of air pollution was enhanced by smoking, that a disorder of ciliary movement of bronchial epithelium was deteriorated, resiliancy of bronchial walls was lost and impaired the defence mechanism against foreign matter, and consequently increased the deposit of carbon and other particles causing cancer. Therefore, smokers inhabiting highly polluted areas may be regarded as having a high potential for becoming cancerous. It was also confirmed that lung cancers were often caused by chronic lung ailment which is closely related to air pollution.

16873 APTIC NO. 34686

Henschler, D., A. Stier, H. Beck, and W. Neuman

OLFACTORY THRESHOLD OF SOME IMPORTANT IRRITANT GASES AND MANIFESTATION IN MAN BY LOW CONCENTRATIONS. *Arch. Gewerbepathol. Gewerbehyg., 17(6):547-570, March 9, 1960. 48 refs. Translated from German. 32p.*

An investigation was conducted to determine olfactory threshold and symptoms resulting from the one-half hour exposure of human subjects to different concentrations of sulfur dioxide, ozone, and nitrogen dioxide. The experimental arrangement is described. Sulfur dioxide in these tests was smelled and/or tasted in some cases at 0.5 ppm, in 75% of the cases at 1.0 ppm, and always at 2.5 ppm, while 5.0 ppm produced coughing. The olfactory threshold for ozone lies below the lowest tested concentration of 0.02 ppm. Nitrogen dioxide is smelled in part at 0.1 ppm, and always starting at 0.4 ppm.

16874 APTIC NO. 34725

Hyde, Richard W., Matthew G. Marin, Richard I. Rynes, George Karreman, and Robert E. Forster

MEASUREMENT OF UNEVEN DISTRIBUTION OF PULMONARY BLOOD FLOW TO CO DIFFUSING CAPACITY. *J. Appl. Physiol., 31(4):605-612, Oct. 1971. 35 refs.*

During breath holding with four percent carbon monoxide in the alveoli, if the pulmonary blood flow (Qc) is unevenly distributed to the diffusing capacity (Dl), the hemoglobin in some capillaries may become saturated with CO. Since these capillaries can no longer take up CO, the calculated Dl will be reduced compared to Dl measured with 0.2% CO in the alveoli. The degree of uneven Dl/Qc can then be determined from the difference between Dl0.2% and Dl4.0%. In five supine normal subjects DL4.0% was 14% less than DL0.2% and was compatible with a pattern of uneven Dl/Qc in which 19% of Qc was distributed to 50% of Dl. In three sitting subjects DL4.0% was 11% less than DL0.2% and 25% of Qc was distributed to 50% of Dl. Since uneven Dl/Qc did not increase in the sitting position, uneven Qc secondary to gravitational forces is probably not the major cause of uneven DL/Qc. Possible mechanisms for the observed uneven DL/Qc include anatomical variation in capillary length, pulsatile Qc, pulsatile capillary volume, and uneven distribution of Qc within terminal airways secondary to sequential ventilation. (Author abstract modified)

16875 APTIC NO. 34952

Imamura, Yoshimi

STUDIES ON THE INDUSTRIAL LEAD POISONING. I. ABSORPTION, TRANSPORTATION, DEPOSITION, AND EXCRETION OF LEAD. 3. AN EXPERIMENTAL STUDY OF LEAD INTAKE IN HUMAN BEING. *Osaka City Med. J. (Japan), 3(2):167-194, Jan. 1957. 28 refs. (Presented at the Japan Association of Hygiene, Annual Meeting, 24th, 1954.)*

Lead acetate was given orally to three normal Japanese male adults daily. Three mg lead acetate was given for the first 61 days and six mg for the second 60 days. Lead intake was discontinued for the last five months. During the experiments, the absorption and excretion of lead was measured. Lead intake is recovered in the feces most rapidly and most quantitatively, followed by the urine, and blood. The amount of lead in the blood and that excreted in the urine and feces was greater than that of a normal person. Of the lead given orally 70-80% is excreted and the rest is retained in the body. The amount of lead ingested did not cause any distinct changes except for a decrease in the number of erythrocytes and hemoglobin content. An abnormal increase of coproporphyrin excreted in the urine was observed during lead ingestion, in spite of an absence of manifest clinical symptoms. Lead intake had no effect on normal liver functions. (Author conclusions modified)

16876 APTIC NO. 34528

Kandus, J. and Z. Jurica

THE INFLUENCE OF SO2 ON THE INCIDENCE OF LOWER RESPIRATORY WAYS DISEASES. *(Vliv kyslicniku siriciteho na incidenci chorob dolnich cest dychacich). Text in Czech. Cesk. Hyg. (Prague), 16(4/5):135-140, 1971. 34 refs.*

The relationship between respiratory disease morbidity rate and degree of sulfur dioxide pollution was studied in a sample comprising 3547 men and women. The acute respiratory morbidity rate was significantly higher not only on the days with increased levels of SO2 concentration, but also during the two days following the exposure. A relationship was not found between morbidity rate and outdoor temperatures. High concentrations of SO2 were recorded during November and December, which were in agreement with high morbidity rates. (Author summary modified)

16877 APTIC NO. 34345

Koenig K. G.

FLUORIDE AS ENVIRONMENTAL FACTOR. *(Fluorid als Umweltfaktor). Text in German. Oeffentl. Gesundheitswesen (Stuttgart), 33(4):146-157, Nov. 1971. 10 refs.*

The residents in the immediate vicinity of industries which emit fluoride containing dust or smoke are not greatly in danger. Examination of the physical condition of residents in the vicinity of the aluminum factory Badisch-Rheinfelden in Switzerland revealed no direct or indirect influence of fluorine-containing waste gases, not even spots on the teeth of children, the first sign of a slight overdose of fluorine intake. In the same area, however, fluorosis in cattle occurred. This can be explained by the fact that the cows ingested hundred times the dose of man. In addition, they suffered from a lack of minerals. Fluoride containing dusts which settle on vegetables can be washed off with water. On an Island near Vancouver, 1500 m from an aluminum plant, no bone changes or spotted dental enamel was found among the children which ingested the vegetables exposed to the fluorine-containing waste gases.

16878 APTIC NO. 34428

Krain, Lawrence Stirling

THE RISING INCIDENCE OF CARCINOMA OF THE PANCREAS. *Amer. J. Gastroenterol., 54(5):500-507, Nov. 1970. 22 refs.*

Genetic (hormonal) and environmental factors were evaluated in terms of an association with pancreatic cancer mortality, which has increased nearly three-fold in the last 40 years. The genetic factors were discarded and environmental factors such as cigarette smoking and industrial exposure were emphasized in terms of an association with pancreatic cancer. Evidence was cited from national origin and racial comparisons as supportive of environmental association. An air pollution linkage with pancreatic cancer, at least based on comparative California city air pollution levels, was dismissed due to a nonsignificant association. A broader epidemiologic study focusing on cigarette smoke and industrial chemical constituents is suggested. Males, females ages, and races were compared. (Author summary)

16879 APTIC NO. 34791

Mao, Peter and John J. Molnar

THE FINE STRUCTURE AND HISTOCHEMISTRY OF LEAD-INDUCED RENAL TUMORS IN RATS. *Am. J. Pathol., 50(4):571-603, April 1967. 27 refs.*

The fine structure and histochemistry of lead-induced renal tumors in rats are described, and some data on the distribution of lead in the tumors themselves and in the tumor-bearing kidneys are presented. In 31 of 40 rats subjected to a long-term feeding of a diet containing one percent basic lead acetate, renal epithelial tumors were produced; the tumors displayed a varying histologic pattern and were composed of solid, papillary, or acinar-glandular structures. By electron microscopy, tumor cells showed varying degrees of differentiation. Well-differentiated cells resembled normal renal tubular epithelium, while poorly differentiated ones exhibited no features suggesting origin from renal tubules. Nuclear and nucleolar hypertrophy was frequent and probably signified enhanced cellular activity. The most prominent structural alterations appeared in the mitochondria of tumor cells; these served to correlate with the functional and enzymic abnormalities known to occur in neoplasms. Numerous lysosomes were present, and some of these probably contained lead and ferritin particles. Microbodies were numerous within the neoplastic cells. The absence of basal plasma membrane infolding and the relative lack of apical pits or vacuoles in tumor cells, coupled with a marked reduction in adenosine triphosphatase and alkaline phosphatase activity in the microvilli, suggest that the tumor cells play a negligible role in resorptive and transport activities. Chemical analysis showed lead in the tumors, but the adjacent renal parenchyma always contained a significantly greater amount. (Author summary modified)

16880 APTIC NO. 34699

Markush, Robert E.

NATIONAL CHRONIC RESPIRATORY DISEASE MORTALITY STUDY. I. PREVALENCE AND SEVERITY AT DEATTH OF CHRONIC RESPIRATORY DISEASES IN THE UNITED STATES, 1963. *J. Chronic Diseases, vol. 21:129-141, 1968. 29 refs.*

To evaluate published vital statistics indicating a marked increase since 1950 in the U. S. death rate from chronic respiratory diseases, the certifiers of 3193 deaths between July and October 1963 were queried by mail on the presence and severity of several chronic respiratory diseases (exluding tuberculosis, lung cancer, and occupational pneumoconioses). The prevalence at death of the chronic respiratory diseases was more than nine times greater than its underlying cause death rate. Also, the certifiers listed on the death certificates only half of the severe chronic respiratory disease present at death. This suggests that vital statistics based on death certificates may seriously underestimate the contribution of chronic respiratory diseases to U. S. deaths. Epidemiologic observations on the rapidly increasing U. S. mortality rate from chronic respiratory diseases, their relatively small contribution to U. S. mortality compared to United Kingdom mortality, and their relatively high mortality rates in several states could be statistical artifacts arising from variation in habits of death certification. (Author summary modified)

16881 APTIC NO. 34558

Martin, A. E., R. E. Waller, and P. J. Lawther

DAILY VARIATIONS IN MORTALITY IN GREATER LONDON IN RELATION TO AIR POLLUTION. *Brit. J. Prevent. Social Med. (London), 25(1):56, Feb. 1971.*

Variations in the daily death rate in Greater London during 10 winters were linked with measurements of pollution and observations of weather. In earlier winters, there were many occasions on which the daily death rate was significantly greater than the moving average, and these mainly coincided with days of high pollution. In recent winters, variations in the daily death rate have been little more than random, and there have been few days of high pollution. This is due to the reduction of pollution in London and improvements in health care.

16882 APTIC NO. 34817

Matsumura, Tatsuo, Toshisada Kimura, Kouji Tateno, Eisuke Kato, Masao Todokoro, Shigeki Nakajima, and Takayoshi Kuroume

RICE POLLEN ASTHMA. *J. Asthma Res., 7(1):7-16, Sept. 1969. 3 refs.*

Asthmatic attacks in Japan are most frequent and severe in autumn, the season during which rice comes into flower. Two peaks of marked increase in the amount of pollen were found in the period from May to September, 1967. The first peak lasted a month from the beginning of May to the beginning of June; the second occurred from the middle of July to the end of October. In 34 of 41 asthmatic children, the asthma attacks occurred mostly in autumn, closely corresponding to the pollination of the rice plant. On scratch tests with rice pollen extract, 10 of 67 asthmatic children showed a positive reaction, while no healthy children showed any positive reaction. On intracutaneous testing, 59 of 61 asthmatic children showed a positive response with 291 PNU/ml of rice pollen extract.

16883 APTIC NO. 34949

Mauzerall, D. and S. Granick

THE OCCURRENCE AND DETERMINATION OF DELTA-AMINOLEVULINIC ACID AND PORPHOBILINOGEN IN URINE. *J. Biol. Chem., vol. 219:435-446, 1956. 17 refs.*

Methods including the use of ion exchange resins were developed for the quantitative determination of porphobilinogen (PBG) and delta-aminolevulinic acid (ALA) in urine porphobilinogen is determined colorimetrically with Ehrlich's reagent. Delta-aminolevulinic acid is determined by condensing it with acetylacetone to form a pyrrole which can react with a modified Ehrlich reagent. The error of the method is less than five percent and the limit of detection (optical density of 0.01 for a 1.0 cm light path) in a one ml sample of urine is one g of PBG and 0.5 g of ALA. Delta-aminolevulinic acid was found in high concentrations in urine of patients with acute porphria and was also detected in normal urine. Some of the factors influencing the selection of optimal conditions for the Ehrlich reaction were discussed. (Author conclusions modified)

16884 APTIC NO. 34419

McEwen, J., Angela Finlayson, A. Mair, and A. A. M. Gibson

MESOTHELIOMA IN SCOTLAND. *Brit. Med. J. (London), 4(5735):575-578, Dec. 5, 1970. 16 refs.*

In a retropsective study of the incidence of mesothelioma in Scotland for 1950-1967, 80 cases were traced from pathological reports and biopsy material of malignant tumors invading the pleura and peritoneum. These cases were matched with two sets of controls. Significantly more cases than either of the two control groups had lived within half a mile of shipbuilding industries, docks, or asbestos factories -- most for more than 30 years. Of the 51 male cases who had residential exposure, all but one also had some evidence of occupational exposure to asbestos. When occupations were grouped according to industry, significantly more men with mesothelioma had been employed at some time in the shipbuilding industry compared with controls. Differences in the smoking habits of the cases of mesothelioma and of the controls were significant at the one percent level. These findings confirmed that the incidence of mesothelioma in Scotland is similar to that in other parts of Britain.

16885 APTIC NO. 34859

Mead, Jere

CONTROL OF RESPIRATORY FREQUENCY. *J. Appl. Physiol., vol. 15:325-336, 1960. 36 refs.*

For a given level of alveolar ventilation, there is a particular respiratory frequency which is least costly in terms of respiratory work. There is also a particular frequency, usually a different one, which is least costly in terms of average force of respiratory muscles. Equations permitting approximate prediction of optimum frequencies were developed and predicted frequencies then compared with observed frequencies were for unanesthetized guinea pigs and for human subjects during exercise and rest. The comparison showed that man at rest breathes at frequencies close to those costing the least in terms of average muscle force, and perhaps somewhat in excess of those that would cost the least in terms of rate of respiratory work. Observations of the effects of imposed mechanical changes demonstrated that internal changes influence frequency more than comparable external changes and to a degree that more closely corresponds to predicted changes. The lungs must, therefore, be the site of receptors responsible for frequency adjustment since only receptors in the lungs could distinguish between external loads and equivalent changes in the lungs. (Author abstract modified)

16886 APTIC NO. 34951

Mehani, Shawkia

LEAD RETENTION BY THE LUNGS OF LEAD-EXPOSED WORKERS. *Ann. Occupational Hyg., vol. 9:165-171, 1966. 12 refs.*

The retention of lead dust and fumes in the lungs of 51 lead workers, 22 shipburners, and 25 control subjects was studied. Apparatus included a respirometer, air sampler, and filter. About 39-47% by weight of the inspired lead is retained in the lungs of lead-exposed workers, and in this group, the average ventilation under various working conditions is approximately 10 cu m/8.0 hr shift. At an atmospheric concentration of lead of two mg/10 cu m of air, the working conditions are within safe limits, as the amount of lead retained per shift was less than one half the amount which can be tolerated by man without producing evidence of ill-health. The degree of lead retention was not associated with the depth of breathing. The various factors which affect dust retention were discussed. (Author summary modified)

16887 APTIC NO. 34645

Miyaji, Kazuma

PATHOLOGICAL STUDY CONCERNING RESPIRATORY PHYSIOLOGY AND SEROLOGICAL STUDY OF VICTIMS OF POLLUTIONS. (PART 1) CLINICAL STUDY OF OBSTRUCTIVE RESPIRATORY DISEASES DUE TO AIR POLLUTION. *(Kogai kanja no kokyu seiribyotai gaku teki kenkyu narabini kesseigaku teki kenkyu. (Sono 1) Taiki osen ni yoru heisoku sei kokyuki shikkan no rinsho teki kenkyu). Text in Japanese. In: A study of the administration method of medical care for sufferers from public nuisance in Yokkaichi City. Committee of Mie Prefectural Medical Insurance on Public Nuisance (Japan), p. 69-78, March 1970.*

Patients with obstructive respiratory diseases were classified into two groups: patients who were attacked with the disease before 1959 without the influence of air pollution and patients who were attacked after 1960 when air pollution became intensive. Clinical condition, testing method, and therapeutics of respiratory disease were studied. About 70% of all the patients of the diseases belong to the group affected by air pollution. Obstructive respiratory diseases were classified into bronchial asthma, chronic bronchitis, and pulmonary emphysema. The results indicated that the number of patients with bronchial asthma was extremely high (50% of all the cases) in the second group, there was little influence of a hereditary or allergic nature, and the positivity rate of an intradermal reaction of house dust was also very low. Intradermal reaction tests given to asthma patients of Yokkaichi City showed that the positivity rate was extremely low as far as instant reaction by means of an one-tenth solution was concerned. The hypersensibility test of the bronchus showed that 70% of bronchial asthma patients were positive. Half of the bronchial asthma patients showed improvement of stenosis. Blood plasma histamine in patients with bronchial asthma was high when they were in an aggravated condition. Yokkaichi asthma is a kind of allergic disorder. Ten items such as chest X-ray test, scanning of lungs by RI, electrocardiogram, immunological reference by serum protein, various kinds of intradermal reaction tests, and examination of the function of adrenal cortical hormone were emphasized. Therapeutics was effective to nine patients out of 17 patients of Yokkaichi asthma.

16888 APTIC NO. 34692

Molyneux, M. K. B.

USE OF SINGLE URINE SAMPLES FOR THE ASSESSMENT OF LEAD ABSORPTION. *Brit. J. Ind. Med., (London), vol. 21:203-209, 1964. 9 refs.*

The variation of urinary lead concentration of short-period samples was studied in a group of men exposed to inorganic lead dust. The urinary specific gravity was used to correct for the variation in urinary volume, but the residual variation was still too great to assess the mean lead concentration. The effect of creatinine correction was studied as an alternative, but there is no statistical difference between either method of correction. The variation of lead concentration is related to the time of day. The highest concentration occurs at approximately 4:00 PM in day workers. The diurnal rhythm of the lead excretion rate is described in day and night shift workers. The rate of excretion rises to a maximum at approximately 5:00 PM in the former but decreases in night workers, falling to a minimum at approximately 2:00 AM. The rhythm is independent of immediate exposure and is thought to be physiological in origin. The plasma lead clearance is estimated at 1.4 ml plasma/min. This suggests that only a small proportion of plasma lead may be ultrafiltrable and that little lead is secreted by the tubules. (Author abstract)

16889 APTIC NO. 34593

Morgan, Jean M., Helen B. Burch, and Joyce B. Watkins

TISSUE CADMIUM AND ZINC CONTENT IN EMPHYSEMA AND BRONCHOGENIC CARCINOMA. *J. Chronic Diseases, 24(2-3):107-110, July 1971. 13 refs.*

Hospital and autopsy records were reviewed and twenty-six patients with definite postmortem evidence of emphysema and with bronchitis in almost all cases, and nineteen patients with both carcinoma of the lung and emphysema were compared as to zinc and cadmium tissue concentrations. Another group of twenty-three patients had lung cancer but without clinical or postmortem evidence of significant emphysema. Tissue cadmium was generally higher in all three study groups compared to the control group of thirty-six patients without chronic renal or hepatic disease, neoplasia in any form, or chronic obstructive lung disease. This was significant for both liver and kidney for those with carcinoma of the lung either alone or in conjunction with emphysema. Liver tissue, but not renal tissue, in emphysema, contained significantly more cadmium. Zinc concentrations varied widely, but were significantly increased in patients with lung cancer without emphysema. This suggests that the abnormality in trace metal content is not specific for cadmium in patients with primary tumor.

16890 APTIC NO. 34847

Morrow, J. J., G. Urta, and A. Goldberg

THE EFFECT OF LEAD AND FERROUS AND FERRIC IRON ON DELTA-AMINOLAEVULIC ACID SYNTHETASE. *Clin. Sci., vol. 37:533-538, 1969. 11 refs.*

Properties of delta-aminolaevulic acid synthetase were studied colorimetrically using particles of chicken cell haemolysate as the source of enzyme, glycine and alpha-ketoglutarate as substrates, and optimal concentrations of pyridoxal phosphate, coenzyme A, ethylenediaminetetraacetic acid, and magnesium chloride. There was a direct linear relationship between the amount of haemolysate added to the system and the delta-aminolaevulic acid formed. Optimal activity occurred with one-millimole EDTA. The effects of lead and ferrous or ferric iron were comparable in the presence and absence of EDTA. Ferrous iron in concentrations of 1,000,000 M increased enzyme activity by 12% and at 0.001 depressed activity by 56%. Ferric iron had no stimulating action but depressed activity by 12% at 0.001 M. Lead caused progressive depression of activity with increasing concentration. High concentrations of ferrous iron caused marked reduction in delta-aminolaevulic acid synthetase activity; this is in keeping with the observation that certain refractory anemias can be aggravated by excess iron.

16891 APTIC NO. 34914

Muro, Luis A. and Robert A. Goyer

CHROMOSOME DAMAGE IN EXPERIMENTAL LEAD POISONING. *Arch. Pathol., vol. 87:660-663, June 1969. 18 refs.*

Chromosomes from leukocyte cultures from mice fed a diet containing one percent lead acetate show an increased number of gap-break type aberrations. The observed chromosome abnormalities largely involve only single chromatids. This suggests the damage occurred after the deoxyribonucleic acid synthesis phase of the cell cycle. A possible relationship between increased DNA ase activity and the chromosome damage is discussed. These findings are of interest with respect to the known effect of lead on reduction of fertility and possible oncogenesis and teratogenesis. Chromosome analysis of persons suffering from lead intoxication is urged. (Author abstract)

16892 APTIC NO. 34850

Myerson, Ralph M. and John E. Eisenhauer

ATRIOVENTRICULAR CONDUCTION DEFECTS IN LEAD POISONING. *Am. J. Cardiol., vol. 11:409-412, March 1963. 7 refs.*

Two lead smelters hospitalized with lead poisoning manifested disturbances in atrioventricular conduction. In one patient, the lead levels were highest. A gradual return to a normal interval occurred during hospitalization and following edathamil calcium disodium (EDTA) therapy. In the second patient, ectopic atrial pacemakers, at times associated with prolongation of the P-R interval, dominated the electrocardiographic abnormality. The electrocardiogram returned to normal after hospitalization and EDTA treatment. Recurrences followed re-exposure to lead. Increased vagal tone produced by lead appears the most likely mechanism for the conduction effects. Blood lead values and 24-hr urinary values during EDTA treatment are tabulated.

16893 APTIC NO. 34756

Neal, Paul A.

MERCURY POISONING FROM THE PUBLIC HEALTH VIEWPOINT. *Am. J. Public Health, 28(8):907-915, Aug. 1938. 9 refs. (Presented at the American Public Health Association, Annual Meeting, 66th, New York, Oct. 5, 1937.)*

Principal industrial sources include mining, chemical processing, and the manufacture of felt hats, electrical equipment, pharmaceuticals, photography supplies, and explosives. Mercury can enter the body by inhalation of vapor or finely divided dust, by ingestion, through the skin, and through the subcutaneous tissues. The symptomatology of chronic mercurialism falls into two types, one with stomatitis, colitis, and nephritis predominating, and the other with tremor and other neurological symptoms most characteristic. The quantity of mercury in the air sufficient to cause chronic mercurialism cannot be definitely stated. Age, sex, individual susceptibility, and the physical condition of the individual play some part in determining the reaction to mercury-vapor exposure. The prevention of industrial mercurialism consists primarily in avoiding the inhalation of mercury vapors and dusts. This is an engineering as well as a medical problem, requiring special local exhaust ventilation, good natural and mechanical ventilation, good housekeeping, general sanitation, and in certain occupations, positive pressure masks.

16894 APTIC NO. 34802

Nishiwaki, T. Y., Y. Tsunetoshi, T. Shimizu, M. Ueda, N. Nakayama, H. Takahashi, A. Ichinosawa, S. Kajihara, A. Ohshino, M. Ogino, and K. Sakaki

ATMOSPHERIC CONTAMINATION OF INDUSTRIAL AREAS INCLUDING FOSSIL-FUEL POWER STATIONS, AND A METHOD OF EVALUATING POSSIBLE EFFECTS ON INHABITANTS. *International Atomic Energy Agency, Vienna (Austria), and Atomic Energy Commission, Washington, D. C., Symp. Environ.*

Aspects Nucl. Power Stations, New York, 1970, p. 247-278. 18 refs. (Aug. 10-14, Paper 146/16.)

Atmospheric contamination of industrial areas in Osaka was investigated with respect to fossil-fueled power plants, effects on human health, and control methods. The principal pollutants from the power plants were fly ash, sulfur oxides, nitrogen oxides, carbon dioxide, carbon monoxide, smoke, and soot. Atmospheric conditions, including SOx content, suspended particulates, wind direction and velocity, temperature, and humidity were monitored. Based on a survey of respiratory diseases, mainly chronic bronchitis, correlated with smoking and age, the prevalence was determined with respect to pollution. The prevalence of chronic bronchitis increased with an increase in precipitation rates of SOx. A mathematical formula was deduced, using the precipitation rate of SOx as a pollution index, to model the projected effects of air pollution on human health. The suggested controls included ultra-high stacks, low sulfur content fuels, and desulfurization processes. The possibility of changing to nuclear power was discussed.

16895 APTIC NO. 34468

Nose, Yoshimitsu, M. Nakayama, and K. Fujii

RELATION BETWEEN AIR POLLUTION AND PULMONAL VENTILATORY CAPACITY OF SCHOOL CHILDREN, ESPECIALLY ON THE SEXUAL DISTINCTION AT THE AGE OF PUBERTY. PART 2. RELATION BETWEEN AIR POLLUTION AND WRIGHT S PEAK FLOW RATE AT THE AGE OF PUBERTY. *(Taikiosen to gakudo no haikanki kino tono kankei tokuni shincho kyuzo ki no seisa ni tsuite. Dai 2. Hen taikiosen to shincho kyuzo ki no P.F.R. tono kankei). Ind Health, no. 17:20-28, Dec. 1970. 7 refs.*

School children in the fifth and sixth grades of an elementary school and in a junior high school in districts with varying amounts of air pollution were examined to establish the relationship between air pollution peak flow rate, and puberty. The peak flow rate for the elementary school boys declined sharply in the highly polluted district, where dust fall was 39 t/sq km/month and S02 concentration was 0.79 mg S03/100 sq cm/day, and slightly in the district with light pollution, with 16 t/sq km/month dust fall and 0.45 mg S02 concentration. In the second and third year students of the junior high school, the value of peak flow rate declined more among the girls than the boys. The peak flow rate index was revised by stature for the fifth grade elementary school and first year junior high school students. The peak flow rate index of fifth grade girls in the medium and tall groups exceeded that of the boys, while the converse was determined for the first year junior high school students.

16896 APTIC NO. 34738

Nye, L. J. J.

AN INVESTIGATION OF THE EXTRAORDINARY INCIDENCE OF CHRONIC NEPHRITIS IN YOUNG PEOPLE IN QUEENSLAND. *Med. J. Australia, (Sydney) vol. 2:145-159, Aug. 3, 1929. 29 refs. (Presented at the British Medical Association, Queensland Branch, March 1, 1929.)*

An extraordinary incidence of chronic nephritis in persons between the ages of ten and forty has been observed in Queensland, Australia. The type of nephritis is a chronic diffuse sclerosis of the kidney tissue and the name nephrosclerosis is submitted as a more appropriate term. In eighty consecutive case records of so-called interstitial nephritis it was found that in fourteen there was a history of the patient having received treatment for plumbism in childhood. Of twenty-two patients who were interviewed, twenty had spent their childhood in wooden houses with chalky paint on the walls and railings, while sixteen were nail biters or thumb suckers. The incidence of lead poisoning in Queensland is also remarkably high. Records have been made of the results of physical examination and renal function tests on twelve children who have suffered from previous lead poisoning, and on three who gave a history of frequently licking the rain drops from the veranda railings after a storm. All of these patients exhibited renal insufficiency. Nephrosclerosis is most prevalent where the houses are built of wood and where children are confined to verandas. A close association has been observed between houses painted with lead paint, nail biters or thumb suckers, lead poisoning, and chronic nephritis.

16897 APTIC NO. 34644

Oshima, Hidehiko, Masayuki Imai, and Katsumi Yoshida

EXPERIMENT ON CHRONIC TOXICATION DUE TO INHALATION OF SULFUROUS GAS. EXPERIMENT ON GROWTH OF MOUSE IN THE CONTAMINATED AREA AND CONTROLLED AREA. *(Aryusangasu kyunyu ni yoru manseichudoku jikken. Osenchiku taishochiku deno mausu no seicho kansatsu jikken). Text in Japanese. In: A study of the administration method of medical care for sufferers from public nuisance in Yokkaichi City. Committee of Mie Prefectural Medical Insurance on Public Nuisance (Japan), p. 57-59, March 1970.*

Fifteen rats were reared since September, 1969 at the Isozu district in Yokkaichi City where air pollution was most severe. Ten rats reared at the University in Tsu were used as controls. The rats were raised outside and were killed after six months, one year, and a year and half. Average concentrations of pollutants in Isozu were: 0.140 mg/day/100 sq cm nitrogen and 1.269 mg/day/100 sq cm. sulfur dioxide. According to histological findings, lung congestion, neutrocytes around the bronchus, infiltration of lymphocyte, and emphysemtous changes were observed among the rats raised six months in Isozu. Among the rats reared one year in Isozu, emphysematous change on the lungs was obvious, and infiltration of inflammatory cells in the interstice was observed. Among the rats reared a year and a half in Isozu, pulmonary emphysema and cell infiltration of interstice were observed. Among the rats reared one year and a half in Tsu, no significant changes were observed except for lung congestion, slight cell infiltration of the interstice and spleen congestion. In conclusion, six month exposure between September and February caused bronchitis and a year and a half exposure causes pulmonary emphysema.

16898 APTIC NO. 34851

Oyasu, Ryoichi, Hector A. Battifora, Raymond A. Clasen, James H. McDonald, and George M. Hass

INDUCTION OF CEREBRAL GLIOMAS IN RATS WITH DIETARY LEAD SUBACETATE AND 2-ACETYLAMINOFLUORENE. *Cancer Res., vol. 30:1248-1261, May 1970. 65 refs.*

In a study of neoplasma induced by 2-acetylaminofluorene (2-AAF), 25 gliomas and three extracerebral intracranial tumors were found in 988 Wistar and caesarian-delivered (Sprague-Dawley) rats, of which 663 were used in experimental groups and 325 in control groups. The tumors usually developed after 52 weeks. Most tumors were classified as poorly deferentiated malignant gliomas. The highest incidence (8.6%) of gliomas was in animals ingesting lead subacetate; the difference compared with the incidence (0.3%) among controls was statistically significant. In animals given 2-AAF with or without olive oil, carbon tetrachloride, or ethionine, the incidence (2.5%) of gliomas was lower and their development was usually delayed until after 60 weeks of age; but the incidence (5.5%) among rats surviving 60 weeks or more was statistically significant when compared with that of 325 control rats in which only one glioma was found. Unsuccessful attempts were made to increase the incidence of gliomas by combining lead subacetate with 2-AAF management and by local freezing of the brain in the early stage of prolonged 2-AAF dietary treatment. (Author summary modified)

16899 APTIC NO. 34947

Palmisano, Paul A., Raphael C. Sneed, and George Cassady

UNTAXED WHISKEY AND FETAL LEAD EXPOSURE. *J. Pediat., 75(5):869-872, Nov. 1969. 9 refs.*

A 10-week-old infant with evidence of neurological defects, intrauterine growth retardation, and postnatal failure to thrive was studied for abnormal lead accumulation because of a maternal history of long-term ingestion of untaxed whiskey. After challenge doses of calcium disodium edetate (CaEDTA), the following 24-hr urine lead concentration was 620 microgram/liter for the infant and 600 microgram/liter for the mother. Published normal values are 0-80 microgram/liter for adults. These data provide suggestive evidence of transmission of lead transplacentally. Because of the widespread ingestion of untaxed whiskey in the southeastern U. S., intrauterine lead exposure may be a cause of fetal and neonatal disease. (Author summary modified)

16900 APTIC NO. 34895

Paulson, Glenn L., D. Max Snodderly, and William L. R. Cruce

AIR POLLUTION IN THE QUEENS-MIDTOWN AND BROOKLYN-BATTERY TUNNELS. *Scientists Commmittee for Public Information, Inc., New York 13p., July 11, 1969. 20 refs.*

Measured levels of carbon monoxide, nitrogen oxides, lead, suspended particulates, and aldehydes in two New York City vehicular tunnels, and the possible health effects of these levels are reviewed. Short-term exposure to CO has hemoglobin effects; long-term exposure may have cardiovascular implications. Potential synergistic effects are considered for sulfur dioxide and particulate matter, for nitrogen oxides, aldehydes, and SO2; and for CO and lead. Various studies indicate that the measured levels of CO are high enough to be causing short-term psychological effects in the men breathing them for a working day and that measured particulate levels, if sustained and coupled with New York SO2 levels, may be causing adverse health effects. Recommendations include improved tunnel ventilation, further studies on short-term and long-term health effects, improved air quality monitoring, definition of either occupational or ambient air quality standards within the tunnels, and rapid disclosure of publicly-funded studies.

16901 APTIC NO. 34727

Pudelski, Jozef, Kazimierz Oklek, and Leonard Deloff

EPIDEMIOLOGICAL SITUATION OF CHRONIC NONSPECIFIC DISEASES OF THE LUNG IN INHABITANTS OF THE TOWN OF ZABRZE. *(Obraz epidemiologiczny przewleklych nieswoistych chorob pluc u mieszkancow miasta Zabrza). Text in Polish. Gruzlica Choroby Pluc, 39(7):604-609, 1971.*

The incidence of manifestations of chronic nonspecific bronchopulmonary diseases in men from 40-60 years old was epidemiologically investigated in Zqbrze, an industrial town with high atmospheric pollution. Based on mass surveys, questionnaires, and spirographic tests of 90% of the population, 76% of those examined were smokers and 84% were exposed to dust as an occupational hazard. Symptoms of chronic cough were determined in 29%; expectoration in 21.7%; both cough and expectoration in 20%; II grade dyspnea in 22%; III grade dyspnea in 11.6%. Spirographic signs of obturation were present in 18%, with greater frequency and severity in the older age group.

16902 APTIC NO. 34942

Radoseevic, Zdenko, Marko Saric, Tihomil Beritic, and Jelica Kenzevic

THE KIDNEY IN LEAD POISONING. *Brit. J. Ind. Med. (London), vol. 18:222- 230, 1961. 52 refs.*

Clinical observations of kidney function in 53 patients suffering from lead poisoning are presented. In 44 patients (40 men and 4 women) lead poisoning was due to occupational hazards, and in nine (five men and four women) to the use of lead-glazed pottery. Permanent changes in the form of chronic nephropathy were observed in only two patients, and these were the two cases in which exposure to lead was the longest and most intense. Twenty-three patients showed functional renal lesions which tended to reverse to normal. In addition to the cases of organic nephropathy, blood pressure was persistently raised in one patient; in two patients a raised blood pressure was observed only in the acute stage of poisoning. The disturbances of renal functiona observed in this study may be ascribed to disordered intrarenal circulation, due to the spastic effect of lead on intrarenal blood vessels, and to a direct toxic or indirect hypoxic effect of lead on the tubules. (Author abstract modified)

16903 APTIC NO. 34913

Robinson, Morton J., Felix E. Karpinski, Jr., and Heinrich Brieger

THE CONCENTRATION OF LEAD IN PLASMA, WHOLE BLOOD AND ERYTHROCYTES OF INFANTS AND CHILDREN. *Pediatrics, vol. 21:793-797, May 1958. 20 refs.*

The concentration of lead in the blood of 103 infants and children without history of pica or lead poisoning, ranging in age from five hours to 13 years, was studied. The children were divided into three groups according to age: Group I, five hours to six months of age; Group II, 6.1 months to four years of age; Group III, older than four years. The values obtained in Group I were significantly lower than those obtained in Groups II and III. Groups II and III showed approximately the same content of lead in whole blood and erythrocytes. The range in Group I was 0.005 0.031 mg/100 ml of whole blood and 0.010-0.090 mg/100 ml of erythrocytes. In the two groups more than six months of age, the range for whole blood was found to be 0.003-0.054 mg/100 ml, and for erythrocytes 0.003-0.144 mg/100 ml; 90% of the values were between 0.015 and 0.040 mg/100 ml (whole blood), and between 0.028 and 0.103 mg/100 ml (erythrocytes). Significant amounts of lead were found in the whole blood (0.007-0.028 mg/100 ml), and erythrocytes (0.010-0.044 mg/100 ml) of newborn infants. (Author summary modified)

16904 APTIC NO. 34943

Rosenblum, William I. and Margaret G. Johnson

NEUROPATHOLOGIC CHANGES PRODUCED IN SUCKLING MICE BY ADDING LEAD TO THE MATERNAL DIET. *Arch. Pathol., vol. 85:640-648, June 1968. 13 refs.*

Suckling mice were intoxicated via maternal milk, by placing lead carbonate in the diet of the maternal animals immediately after they had given birth. Intoxicated neonates displayed faulty growth and development, and revealed hematologic evidence of lead intoxication. Neuropathologic findings included abnormally large numbers of fibrous, intercapillary strands in several cerebral loci, and astrocytosis in the hippocampus. The latter was recognized most easily in sections stained with phosphotungstic acid hematoxylin. In addition, metallic impregnations for astrocytes and microglia revealed consistent differences between experimental and control material suggesting a general alteration in the properties of glia and/or cerebral tissue of intoxicated mice. (Author abstract)

16905 APTIC NO. 34787

Rubino, G. F., E. Pagliardi, V. Prato, and E. Giangrandi

ERYTHROCYTE COPPER AND PORPHYRINS IN LEAD POISONING. *Brit. J. Haematol., vol. 4:103-107, 1958. 21 refs.*

Erythrocyte copper and the free erythrocyte protoporphyrins were determined in 22 patients with lead poisoning All had been exposed to lead poisoning in the course of their work; fourteen presented signs of active lead poisoning and had blood lead concentrations exceeding 60 micrograms/100 ml, and a urinary lead excretion exceeding 100 micrograms/24 hours. The other patients had previously had one or more attacks of lead colic. Abnormally high copper concentrations were found in seventeen patients, with increased protoporphyrin concentrations in all except one of the patients. The increase in copper may be related to the abnormal permeability of the erythrocyte membrane, which is consistently present in the anemia of lead poisoning. Thus, the excess copper would accumulate in the erythrocytes as a consequence of damage to the cells surface.

16906 APTIC NO. 34837

Sandstead, Harold H., Edwin G. Stant, A. Bertram Brill, Luis I. Arias, and Robert T. Terry

LEAD INTOXICATION AND THE THYROID. *Arch. Internal Med., vol. 123:632-635, June 1969. 26 refs.*

Thyroid function was studied in 24 patients judged to have saturnism on the basis of their urinary excretion of lead following an infusion of edetate calcium disodium. Following administration of sodium iodide I-131, the mean 24-hour I-131 uptake for 23 patients was 10.0% plus or minus 3.7% standard deviation. A single patient had an uptake of 26.1%. All but three patients responded normally to treatment with thyroid stimulating hormone. Of two patients studied, one had a decreased secretion of thyroxine by the thyroid. Other measures of thyroid function were normal in the group. The findings are consistent with injury of the iodine concentrating mechanism of the thyroid. (Author abstract)

16907 APTIC NO. 34443

Schlipkoeter, H. W., J. Bruch, A. Brockhaus, and G. G. Fodor

THE EFFECTS OF SOLID, LIQUID, AND GASEOUS POLLUTANTS ON THE LUNGS. *(Die Lunge als Aufnahmeorgan fuer feste, fluessige and gasfoermige Immissionen). Text in German. Praxis Pneumol., 25(9):505-518, Sept. 1971. 19 refs.*

Regulations stipulating maximal permissible concentrations of solid, liquid, and gaseous pollutants must take into consideration whether the pollutants are deposited in the lung, absorbed into the blood stream or cause direct damage to the pulmonary system. Animal experiments and electron microscopic examination of the submicroscopic structure of pulmonary tissues are described designed to determine the parameters influencing pulmonary resorption. Epithelial-alveolar cells are of crucial importance in these studies. In one experiment, the pulmonary resorption of a fine oil aerosol, designed to simulate the behavior of particles soluble in benzene, was determined by determining silicon dioxide in the lung and the mediastinal lymphatic nodes 16 hours, five days, and four weeks following inhalation. Pulmonary resorption was a very complex phenomenon which depends on the penetration power of the particles, their deposition in alveoli their bronchial and lymphatic elimination, particle solubility, and their cytotoxicity. About 95-98% of the sulfur dioxide is retained by the alkaline mucus of the upper respiratory tract; it penetrates into the lung only when adsorbed on the surface of dust particles or when it is catalytically converted to a sulfate-ion aerosol. Non-reactive gases and vapors penetrate the lung by diffusion with the resorption degree proportional to the gas concentration and duration of exposure. Carbon monoxide is also mentioned.

16908 APTIC NO. 34925

Sherwin, Russell P., Janice Dibble, and John Weiner

INCREASE IN ALVEOLAR WALL CELLS OF THE GUINEA PIG IN RESPONSE TO 2 PPM NITROGEN DIOXIDE. *University of Southern California, Los Angeles, Dept of Pathology and University of California, Los Angeles, Dept of Medicine, Air Pollution Control Office Research Grants AP 00774 and AP 00604, 16p., 1971. 6 refs.*

The ratios of lactate dehydrogenase positive alveolar wall cells (primarily Type II pneumocytes) to alveoli were determined for the lungs of control and exposed (continuous two ppm nitrogen dioxide) guinea pigs. The study was divided into three exposure periods of one, two, and three weeks with four pairs of control and exposed animals evaluated for each period. A total of 56,587 LDH alveolar wall cells and 27,720 alveoli were counted on the lungs of all 12 control and 12 exposed guinea pigs. The mean ratio for the control animal group was 1.9, with a range of 1.50 to 3.40 for the upper lobes and 1.26 to 3.16 for the lower lobes. For the exposed group, the mean value was 2.2, with upper and lower lobe ranges of 1.29 to 3.12 and 1.16 to 4.32 respectively. A comparison of the right lower lobe of the control group with that of the exposed group showed a highly significant difference, the control mean being 1.89 plus or minus .115 (S.E.) and that of the exposed group 2.24 plus or minus .204 (S.E.). The progressive increase in the Indices for the right lower lobe with duration of exposure was also significant. The findings tentatively indicate an alteration of the microecology of the lung secondary to, but not specific, for NO2 exposure and further suggest with the support of other studies that Type I cells are being replaced by Type II cells. (Author abstract modified)

16909 APTIC NO. 35040

Shinagawa, Hiroshi, Kimiaki Kubo, Kiyoji Hayashi, Takashi Hattori, and Yoshimichi Okamoto

STUDIES OF CHRONIC OBSTRUCTIVE PULMONARY DISEASES IN YOKKAICHI DISTRICT (FROM THE ASPECT OF PULMONARY EMPHYSEMA). *(Yokkaichi chiku ni okeru mansei heisokusei haishikkan ni kansuru kenkyu (Haikishu no men yori)). In: Studies of the method for controlling respiratory diseases due to air pollution. Text in Japanese. Yokkaichi Medical Assoc. (Japan), p. 115-125, March 1969.*

To observe the pathomorphological changes of chronic obstructive pulmonary diseases in Yokkaichi District, the transition of chronic obstructive disease to pulmonary emphysema or its complications were examined. The subjects were 180 patients over 40 years old with bronchial asthma (A), chronic bronchitis (CB), or asthma and bronchitis (AB) selected among 282 patients with chronic obstructive pulmonary disease who visited the Department of Internal Medicine of Yokkaichi Hospital in 1968. Fixed criteria were used for the diagnosis of each disease. The examination included chest x-ray, pulmonary function tests, and electrocardiagrams which were performed, as a rule, at non-attack times or the intermittent period. There were only 25 patients who hardly showed any abnormality in the chest x-ray findings. Abnormal findings included C.B. most frequently, followed by A.B., and then A. Findings of emphysema like changes were observed in 53 patients, and males were three times more frequent than females in the order of A.B., A, and C.B. Patients were frequently inhabitants of polluted districts. Reversible lowering of one second rate ventilatory capacity and decrease of the pharmaceutical effect were observed. Abnormal findings of ECG were observed in more than one half of the subjects. Approximately 30% of the patients over 40 with bronchial asthma, asthma and bronchitis, and chronic bronchitis have lapsed into a state of functional pulmonary emphysema; reversibility is lost due to the persistence of attack. About 20% of the patients agree with the strict diagnostic criteria of the Study Group of Pulmonary Emphysema and already have pulmonary emphysema or showed complicated symptoms.

16910 APTIC NO. 34355

Silver, Harold M.

CARBON MONOXIDE IN HEALTH AND POLITICS. *Med. Ann. District Columbia, 40(3):169-171, March 1971. 16 refs. (Presented at Doctors Hospital, Ground Rounds, Washington, D. C., Sept. 18, 1970.)*

The physiological effects of carbon monoxide and its implications for environmental pollution are discussed. The most important property of CO in relation to toxicity is its ability to combine with hemoglobin to form carboxyhemoglobin, thus affecting the ability of blood to carry oxygen to the tissues. If the percentage of carboxyhemoglobin present in the blood is less than 10% there are no symptoms, but when it reaches 10-20%, frontal headaches, giddiness, and dilatation of blood vessels may occur. When the level reaches 40-50% there is collapse or loss of consciousness and when it goes above 50%, coma, convulsions, irregular breathing, and death ensue. The most important source of CO in our environment is the incomplete combustion of gasoline in the automotive engine, resulting in an exhaust which contains approximately 3.5% CO. Another important source of individual increase in carboxyhemoglobin levels is cigarette smoking. Federal standards controlling automotive emissions are cited, but inspection is necessary to be sure that performance is as good in the field as it is during test conditions. Abatement of air pollution is intertwined with the sociopolitical problems of the area and physicians may contribute to the solution by providing public information and participating in community action.

16911 APTIC NO. 34722

Starkov, M. V., P. M. Yaverbaum, and E. A. Vyatchina

BIOCHEMICAL AND MORPHOLOGICAL EVALUATION OF COLLAGEN-FORMATION IN THE LUNGS IN EXPERIMENTAL PNEUMOCONIOSES PROVOKED BY MICA AND MIXED DUST OF THE MICA DEPOSITS IN THE IRKUTSK REGION. *(Biokhimicheskaya i morfologicheskaya otsenka kollagenoobrazovaniya v legkiich pri eksperimentalnykh pneumokoniozakh vyzvannykh slyudyanoy pylyu Slyudyanskogo mestorozhdeniya slyudy Irkutskoy oblasti). Text in Russian. Gigiena Truda i Prof. Zabolevaniya, 15(8):42-43, Aug. 1971. 10 refs.*

The dynamics of collagenous accumulation in the lungs of white rats were investigated for the assessment of the development of the coniotic process. Pure crystal quartz (containing 99.8% free silicon dioxide), pure micaceous dust (containing 44.8% bound Si02), or mineral dust (containing 28.5% free Si02) were administered intratracheally as a 50 mg suspension in one ml of saline solution (single dose). The accumulation of collagen was milder in rats treated with mixed dusts originating from the mineral deposits of the Slyudinsk ores than in rats treated with pure crystalline quartz dust. This was probably due to the lower contents of Si02 in the mixed dust. Micaceous dust elicited the lowest fibrogenic activity. The chronic interstitial process, induced by micaceous dust and by the components of the mixed dust, had a certain role in the increase of pulmonary collagenous accumulation in the experimental animals. A sudden increase in collagen formation occurred six months after the beginning of the experiment following fibroplastic proliferation of the lung parenchyma. Rats treated with quartz powder developed typical silicosis with large fibrotic nodular formations 12 months after the beginning of the experiment. Animals treated with micaceous powder developed moderate interstitial sclerosis and nodular granulomas. These nodular formations contained less collagen than the silicotic nodes. Mixed dusts induced the development of nodular pneumoconiosis with more severe interstitial sclerotic processes than in micaceous pneumoconiosis.

16912 APTIC NO. 34687

Stokinger, Herbert E. and Lester D. Scheel

OZONE TOXICITY. *Arch. Environ. Health, vol. 4:117-124, March 1962. 13 refs. (Presented at the Industrial Hygiene Foundation Meeting, Pittsburgh, Pa., Oct. 25, 1961.)*

The inhalation of ozone by rabbits resulted in the production of detectable amounts of circulating antibodies in the serum of the exposed animals. Ultraviolet absorption spectrometry indicated that ozone is capable of altering the structure of tyrosine, a typical aromatic amino acid of proteins. Further evidence of protein change from ozone treatment is the observation of denaturation in the form of reduced solubility of the protein. Present information based on modification of histologic changes in animals injected with ozone-modified egg albumin tends to indicate that the immunochemical response changes only slightly after the normal course of ozone injury in the lung. The striking character of ozone tolerance is discussed, as well as the even more remarkable cross-tolerances among chemically unrelated substances.

16913 APTIC NO. 34896

Toenz, Otmar

RENAL CHANGES INDUCED IN RATS BY EXPERIMENTAL CHRONIC LEAD INTOXICATION. *(Nierenveraenderungen bei experimenteller chronischer Bleivergiftung (Ratten)). Text in German. Z. Gesamte Med., no. 128:361-377, 1957. 58 refs.*

A weekly injection of 20 mg lead phosphate to rats over a period of several months produced kidney enlargement from enlarged tubular epithelial cells with cellular nuclei which increased in size, and whose polymorphism increased considerably as a result of the intoxication. Nucleoli were transformed into inclusion bodies, and epithelial proliferation was observed which resulted partly in the formation of cysts, partly in the formation of solid proliferation islands, adenomas, and cancers. The specific action of lead stems from derailed nuclear and cellular metabolism manifested initially by enlargement of nuclei and of cells, then by nuclear polymorphism, pathological mitosis, proliferation, and tumor formation. In its carcinogenic effect, lead resembles irradiation. Identical renal changes were observed in children suffering from lead poisoning. In adults, lead poisoning induces primarily degenerative vascular processes; tubular epithelial changes are diagnosed only infrequently.

16914 APTIC NO. 34776

Treon, J. F., F. P. Cleveland, J. W. Cappel, and R. W. Atchley

THE TOXICITY OF THE VAPORS OF AROCLOR 1242 AND AROCLOR 1254. *Am. Ind. Hyg. Assoc. Quart., 17(2):204-213, June 1956. 3 refs. (Presented at the American Industrial Hygiene Association, Annual Meeting, 7th, Philadelphia, Pa., April 26, 1956.)*

Prolonged intermittent exposure of animals to the vapor of Aroclor 1242 demonstrated no injury, while prolonged exposure to comparable concentrations of Aroclor 1254 resulted in reversible degenerative changes in certain viscera. Aroclor 1242 contains 42.0 plus or minus 0.5% of chlorine, an amount which corresponds to a chlorinated biphenyl with three chlorine atoms in unassigned positions. Aroclor 1254 corresponds to pentachlorobiphenyl. Mortality, growth, weight of liver and kidneys, liver function, hematological results, and pathological findings are discussed for the various laboratory animals.

16915 APTIC NO. 34861

Truhaut, Rene

THE FLUORESES. THEIR IMPORTANCE IN INDUSTRIAL AND ALIMENTARY HYGIENE. ANALYTICAL METHODS APPLICABLE TO THEIR STUDY. *(Les fluoreses. Leur importance en hygiene industrielle et en hygiene alimentaire. Les methodes analytiques applicables a leur etude). Preprint. Paris Univ. (France), Faculty of Pharmacy, Translated from French, 77p.*

A toxicological study of fluorine derivatives is presented. The principal compounds which pose an effect to health are indicated, as well as their distribution in nature and their principal industrial uses. Symptoms of exposure to the fluorine derivations are described, including acute and chronic intoxication. Analytical reactions of the fluorine ion are presented. Elimination of fluorosis is discussed.

16916 APTIC NO. 35016

Tsukamoto, Hideyo, Etsuro Koyanagi, Etsuro Kuroda, Kenkichi Itami, Kenzo Sudo, Kingo Umemoto, Masakazu Fujiwara, Susumu Sugimoto, Junichi Masumura, Mitsuru Iwakura, and Junzo Murai

RESULTS OF PHYSICAL EXAMINATION ON INHABITANTS IN TOSHIMA DISTRICH WHICH IS THOUGHT TO BE A NON-POLLUTED AREA IN YOKKAICHI CITY. (REPORT 1). *(Yokkaichi shinai ni okeru hiosenchiku to kangaerareru Tomita chiku ni okeru jumin kenshin seiseki (Dai 1 ho)). In: Studies of the method for controlling respiratory diseases due to air pollution. Text in Japanese. Yokkaich City Medical Assoc. and Nagoya Univ. (Japan), School of Medicine, p. 45-66, March 1969.*

Among inhabitants over 18 years old in Toshima District who replied to a simple questionnaire about chronic bronchitis, 200 were randomly selected for detailed examinations held at the Medical Center of the Yokkaichi Medical Association from December 1968 January 1969. The examination included urinalysis, test of the auricular blood, chest x-rays, pulmonary function tests, intracutaneous test of allergen, measurement of the blood pressure, and electrocardiogram. The number of examinees of the detailed examination was 151. A survey by the BMRC questionnaire method was performed on 46 of the remaining 49. The results of the survey were indicated on the following items: the prevalence rate of symptoms of respiratory diseases according to sex, the structure of the age and sex of the subjects, results of the H.D. intracutaneous test by age, urine protein according to age, urine suger according to age, results of pulmonary function tests on males and females (mean and standard deviations), the mean blood pressure according to age and sex, the results of blood tests on males and females (mean and standard deviations), classification of chest x-ray findings, chest x-ray findings according to sex, abnormal chest x-ray findings, and the format of the survey and clinical chart.

16917 APTIC NO. 35017

Tsukamoto, Hideyo, Kingo Umemoto, Masakazu Fujiwara, Mitsuru Iwakura, and Junzo Shirai

RESULTS OF THE DETAILED EXAMINATION OF THE RESPIRATORY ORGAN PERFORMED AT THE MEDICAL CENTER OF THE MEDICAL ASSOCIATION. *(Ishikai iryo senta ni oite jisshi shita kokyuki seimitsu kenshin seiseki). In: Studies of the method for controlling respiratory diseases due to air pollution. Text in Japanese. Yokkaichi City Medical Assoc. (Japan) and Nagoya Univ. (Japan), School of Medicine, 0 p. 67-75, March 1969.*

The structure of age and sex, the results of clinical diagnosis, and an allergologic survey of the patients who received detailed examinations at the Medical Center of the Yokkaichi City Medical Association from June 1967 through December 1968 were reported. The allergologic survey was performed for 120 adults over 16 years old, 80% of whom were over 40. In addition, 101 were the patients who had applied for the environmental pollution relief law. The distribution of the diseases consisted of 55 cares of bronchial asthma, 21 cases of bronchial asthma and chronic bronchitis, 36 cases of chronic bronchitis, and eight other cases. The items of the survey were the familial history of allergy and the presence or absence of the anamnesis of allergic disease, allergen intracutaneous test, the number of acidophils in the blood and sputum and the airway sensitivity test by inhalation of acetylcholine in the subject. The results of the survey showed no significant differences among the diseases in the familial history of allergy, the positive rate of allergen intracutaneous test and the increase of acidophils in the sputum. Comparison of the anamnesis of allergic disease between asthma and chronic bronchitis patients and between asthma and asthma with chronic bronchitis patients above 40 0revealed a significantly higher rate in asthma and asthama with bronchitis than chronic bronchitis. The number of cases with acidophils increase in the blood was remarkably high in asthma than in bronchitis. The number of cases with acetylcholine value under 1000 gamma was also significantly higher. There were many cases with higher airway sensitivity in asthma than in asthma with bronchitis or bronchitis alone.

16918 APTIC NO. 34674

Ulmer, W. T.

LUNG FUNCTION STUDIES IN EPIDEMIOLOGIC INVESTIGATIONS OF RESPIRATORY DISEASES. *Bull. Physio.-Pathol. Respir. (Nancy), vol. 6:605-616, July-Sept. 1970. 22 refs.*

Airway resistance and intrathoracic gas volume (IGV) were measured in epidemiologic studies of chronic obstructive respiratory diseases. The symptoms of cough and sputum production were tabulated from a random sample of the population of Duisburg, Germany, a heavily polluted city. The frequency of these symptoms was age-dependent and related to smoking habits. A specially adapted body plethysmograph was used to measure airway resistance and IGV. Airway resistance does not appear to correlate with age but is significantly greater among smokers in the older age group. The same pattern is seen with IGV. Arterial blood gases were also measured. Results indicate that the arterial partial pressure of oxygen decreases with age and body weight. However, this measurement has little value in epidemiologic studies since changes in blood gases develop late in the evolution of respiratory diseases.

16919 APTIC NO. 34946

Vigliani, Enrico C.

RECENT STUDIES ON SATURNISM IN ITALY. *(Recenti studi sul saturnismo in Italia). Text in Italian. Med. Lavoro (Milan), 41(4):105-123, April 1950. 107 refs.*

Recent studies published in Italy dealing with lead poisoning bearing on the absorption and elimination of lead, the effect of lead on tissues and organs, and changes induced by lead in the digestive tract, in the nervous system, in the vascular system, in glandular secretion, in metabolism, and especially in porfyrin metabolism are reviewed. Saturnism as an occupational disease was almost completely eradicated in traditional industries which handle lead but appears sporadically in new industries (automobile industry and the manufacture of alloys). When tetraethyl lead was first manufactured in Italy in 1936, numerous intoxications occurred. The symptoms invariably included irritability, insomnia, asthenia, hypertension, tremor, anorexia, and nausea; severe intoxication lead to delirium with hallucinations, psychomotor disorders, coma, and death. The symptoms are due more to the tetraethyl radical than to lead and experiments have demonstrated that tetraethyl intoxication is fatal before lesions characteristic for lead poisoning appear. Therapy of acute lead poisoning is based on the parallelism of the metabolism of calcium and of lead in the organism: a calcium and alkalinizing therapy favors the deposit of lead in bone tissues; when the acute phase of intoxication passes, acidification induces mobilization of the lead from the deposit and subsequent elimination. The effect of calcium therapy in cases of saturnine colic is attributed to its ability to reduce porfyr in uria.

16920 APTIC NO. 35021

Wada, Osamu

AIR POLLUTION AND LEAD - RECENT PROGRESS IN STUDIES OF LEAD POISONING. *(Taikiosen to Namari - Namarichudoku kenkyu no saikin no shinpo). Text in Japanese. (Nippon Ishikai Zasshi (J. Japan Med. Assoc.), 66(7):729-736, Oct. 1971. 22 refs.*

The environmental pollution due to lead is summarized. Lead in the environment and in the human body is discussed. The effect of lead on organisms, the effect of lead on heme synthesis in vitro, abnormality of prophyrin metabolism in persons exposed to lead, and lead metabolism of healthy people are discussed. Lead poisoning, intellectual retardation, and renal disorders are mentioned.

16921 APTIC NO. 34671

Warren, William-Paul and Bram Rose

AIR-BORNE FUNGI AND RESPIRATORY ALLERGY: A MONTREAL STUDY. *Can. Med. Assoc. J. (Toronto), 99(17):827-831, Nov. 2, 1968. 20 refs.*

One hundred patients were tested with several varieties of five different molds found in the air over Montreal: Aspergillus, Cladosporium, Helminthosporium, Mucor, and Penicillium. The predominant reacting varieties were A. fumigatus, C. herbarum, H. halodes, M. plumbeus, and P. expansum. Patients reacting to these allergens usually had reactions to one or more of the others in the same group. In general, patients with asthma reacted to more of the molds than did those with rhinitis. A good correlation was found between the variations in the symptoms reported by the patients and the molds to which they reacted. Patients with respiratory allergies should be tested with a wide variety of locally found molds in addition to routine pollens.

16922 APTIC NO. 34704

Widdicombe, John G., Donald C. Kent, and Jay A. Nadel

MECHANISM OF BRONCHOCONSTRICTION DURING INHALATION OF DUST. *J. Appl. Physiol., vol. 17:613-616, 1962. 20 refs.*

Inhalation of fine charcoal dust decreased airway conductance (increased resistance) in man. Subcutaneous injection of atropine blocked this effect. In paralyzed and artificially ventilated cats, inhalation of dust increased total pulmonary airflow resistance. This was prevented by blocking conduction in the cervical vagosympathetic nerves. Inhalation of dust stimulated activity in single afferent nerve fibers arising in the trachea and also increased activity in efferent parasympathetic nerve fibers going to the lungs. These results establish the reflex nature of bronchoconstriction during inhalation of dust and show its dependence on the cervical vagosympathetic nerves. (Author abstract)

16923 APTIC NO. 34709

Williams, Michael

LEAD POLLUTION ON TRIAL. *New Scientist Sci. J., 51(768):578-580, Sept. 9, 1971. 7 refs.*

Because it has a long biological half-time in the body, lead is a cumulative agent. However, this renders lead less hazardous, for it allows time for measurement, assessment, and suitable action, if necessary. The central nervous system may certainly be involved in severe lead poisoning, but again there is no evidence that it is affected by lower levels of lead absorption, either in adults or in children. While rising lead contamination could be a factor in mental illness, which has also been indicated to be increasing particularly among the young, little actual evidence has been produced to indicate that either lead contamination or mental illness is increasing. It is misleading to imply that certain industrial areas have higher lead levels due to automobile emissions than non-urban areas when industries such as a single lead smelter could be equally at fault.

16924 APTIC NO. 34902

Williams, M. K., E. King, and Joan Walford

AN INVESTIGATION OF LEAD ABSORPTION IN AN ELECTRIC ACCUMULATOR FACTORY WITH THE USE OF PERSONAL SAMPLERS. *Brit. J. Ind. Med. (London), vol. 26:202-216, 1969. 53 refs.*

Thirty-nine lead workers and controls, in stable conditions of exposure, wore personal lead-in-air samplers daily for two weeks. During the second week, samples for blood lead, urinary lead, urinary coproporphyrin, urinary delta-aminolevulinic acid (ALA), the punctate basophil count, and hemoglobin were taken daily. Duplicate estimations were made on one day. The lead exposures of men doing almost identical jobs differed by ratios of up to four to one. This could be attributed only to personal differences in working habits. The correlation coefficients and regression equations of the biochemical tests with lead-in-air and with each other were determined. The mean values and 95% confidence limits of single determinations of some of the biochemical tests corresponding to the two commonly accepted threshold limit values of lead-in-air (0.20 and 0.15 mg/cu m) were calculated from the regression equations. For each biochemical test, the variation due to analytical error, the variation from day to day within subjects and the residual variation about the regression on lead-in-air were calculated. Previous estimates of the latter are not known. Excessive confidence may be placed in an index of exposure due to its low coefficient of variation within subjects unless the coefficient of variation between subjects about regression is taken into account. The correction for specific gravity of estimations of lead and ALA in spot samples of urine reduced slightly the residual variation between subjects about the regression on lead-in-air and to increase the correlations with lead-in-air and with the other biochemical tests, but these changes were not statistically significant. The modified method used for estimating blood lead and urinary lead is described and validated. (Author abstract modified)

16925 APTIC NO. 34822

Wilson, William E., Jr. and E. Harvey McDonald

THE ROLE OF SO2 AND PHOTOCHEMICAL AEROSOL IN EYE IRRITATION FROM PHOTOCHEMICAL SMOG. *Preprint, American Chemical Society, Washington, D. C., Div. of Water, Air and Waste Chemistry, p. 107-112, 1970. 10 refs. (Presented at the American Chemical Society, Division of Water, Air and Waste Chemistry, Chicago, Ill., Sept. 13-18, 1970.)*

Eye irritation measurements were made during several smog chamber experiments to determine the role of sulfur dioxide in eye irritation and to investigate a possible relationship between eye irritation and the reduction in oxidant concentration caused by SO2. With the addition of SO2, a reduction in eye irritation was observed in runs with propylene, 1-heptene, and exhaust from fuel A (65% paraffins, 10% olefins, and 25% aromatics). The addition of SO2 had little effect on exhaust from fuel B (40% paraffins, 5% olefins, and 55% aromatics) or from the olefin-aromatic mixture. Apparently the effect of SO2 on eye irritation is related to the different interaction with olefinic and aromatic compounds but is not directly related to the reduction in oxidant. Eye irritation measurements and other data from one set of runs in which a portion of the photochemically-generated aerosol was removed by mild stirring are given. The results strongly suggest that the aerosol formed during the photochemical reaction of 1-heptene and nitrogen oxides does contribute to eye irritation, and, therefore, that types of photochemical aerosol other than sulfuric acid mist are responsible for eye irritation.

16926 APTIC NO. 34789

Witschi, Hanspeter

DESORPTION OF SOME TOXIC HEAVY METALS FROM HUMAN ERYTHROCYTES IN VITRO. *Acta Haematol., vol. 34:101-115, 1965. 21 refs.*

Human red cells were incubated in vitro with lead-210, mercury-203, and thallium-204 and thereafter washed repeatedly with different washing liquids; the desorption of these metals from the erythrocytes was determined. Lead was removed from the erythrocytes to a greater extent by repeated washings in their own plasma than in pure inorganic medium. In a heterogenous mixture of alpha and beta-globulins including lipoproteins, even more lead was desorbed from the cells than in plasma, albumin or gamma-globulin solutions. It is supposed, therefore, that lead is bound at least partly to the deeper layers of the plasma protein film on the erythrocytic surface. On the other hand, mercury was observed to be rather fixed to lipoproteins, lipids, and/or smaller thiols of the outer surface. Thallium apparently shows no definite predilection to binding sites either in the plasma or in cells.

16927 APTIC NO. 34870

Woestijne, K. P. van der and A. Bouhuys

SPIROMETER RESPONSE AND PRESSURE CORRECTION IN BODY PLETHYSMOGRAPHY. *Prog. Resp. Res., vol. 4:64-74, 1969. 6 refs. (Presented at the International Symposium on Body Plethysmography, Nijmegen, Netherlands, 1968.)*

The frequency response of different volume displacement body plethysmographs can be improved markedly by adding an electrical signal, proportional to the pressure developed inside the plethysmograph, to the volume signal. This pressure correction is accurate in the absence of damping material between plethysmograph and spirometer; also, the spirometer bell should be sufficiently rigid. The frequency response of pressure-corrected plethysmograph-spirometer systems should be tested withh small driving volumes (loudspeaker) as well as with large volume excursions (forced expirations). (Author summary)

16928 APTIC NO. 35007

Wortis, Joseph

POLLUTION, SOMATOPSYCHICS, AND DISEASE. *Biol. Psychiat., vol. 3:103-104, 1971.*

Government standards for clean air are hypocritical, because the standards vary with degrees of industrial concentration, as if human tolerance correlates positively with corporate investment. Too little attention has been paid to the pervasive effects of noxious agents on the nervous system and behavior. Psychological stress can irritate and tire us, and noxious irritants and fatigue can affect our psychology and behavior. Thus, early stages of disease cannot be diagnosed, but are mainly indicated by subjective sensations.

16929 APTIC NO. 34752

EXPERIMENTAL INVESTIGATIONS FOR THE HYGIENIC SUBSTANTIATION OF ADMISSIBLE LEAD THRESHOLDS IN RESERVOIR WATERS. *(Eksperimentalnyye issledovaniya k gigiyenicheskomu obosnovaniyu predelno dopustimoy kontsentratsii svintsa v vode vodoyemov). Text in Russian. Gigiena i Sanit., 18(3):7-10, 1953. 1 ref.*

Experiments were carried out for the assessment of admissible threshold lead (Pb) concentrations in drinking water. The 0.1 mg/l Pb concentration was a threshold value when the effects of Pb on the self-purification process from organic contamination, due to domestic pollution, was studied. This concentration could not affect the organoleptic properties of drinking water since threshold values, in this case were close to 100 mg/l Pb. Chronic experiments with white rats given p.o. 0.05, 0.5 or 5 mg/kg doses of Pb (nitrate salt) for 5 months showed that 0.05 mg/kg dose was the threshold value in terms of blood morphology, blood pressure, urinary urobilin, and tubular bone radiography data. Systematic studies of conditional reflex activity, carried out with 5.0, 0.5, 0.05, and 0.005 mg/kg doses of Pb ion given p.o. to rats for four months revealed that 0.005 mg/kg was a threshold dose for Pb toxicity. The 0.1 mg/l Pb concentration was concluded to be the admissible threshold for Pb concentration in drinking water. This value also corresponds to the established standards by the USSR for drinking water quality.

16930 APTIC NO. 34391

Zelac, R. E., H. L. Cromroy, W. E. Bolch, Jr., B. G. Dunavant, and H. A. Bevis

INHALED OZONE AS A MUTAGEN. II. EFFECT ON THE FREQUENCY OF CHROMOSOME ABERRATIONS OBSERVED IN IRRADIATED CHINESE HAMSTERS. *Environ. Res., vol. 4:325-342, Oct. 1971. 70 refs.*

Chinese hamsters were exposed to x-rays or ozone (or both) to study their combined effect on the frequency of chromosome aberrations. Exposure-adjusted break frequencies for chromosome aberrations produced in circulating blood lymphocytes served as the quantitative measure of widespread damage. Radiation produced 0.000551 breaks/cell rad for cells withdrawn two weeks after exposure. Animals exposed to the two agents simultaneously exhibited more than 70% of the total breaks anticipated, assuming the expected equal contributions to be additive. Projected results for humans, at presently permitted levels, determined that exposure to ozone would be more detrimental than exposure to radiation. (Author abstract modified)

16931 APTIC NO. 34871

Zeltser, M. Ye.

ON THE FUNCTIONAL CONDITION OF THE THYROID GLAND IN SATURNISM. *(Preliminary communication). (K voprosu o Functsional nom sostoyanii shchitovidnoy Zhelezy pri saturnizme). Text in Russian. Tr. Nauk: Issled. Inst. Kraev. Patol. Alma Ata., vol., 10:116-120, 1962. 24 refs.*

The condition of the thyroid gland in white male rats with saturnism induced by daily P.O. treatment with a 0.2% lead acetate solution (1 ml/kg body weight), for 2.5 3 months, was investigated by the radioactive iodine (I(131)) method. A decrease in thyroidal iodine retension with a slow-down of I(131) accumulation and excretion was characteristic for the marked forms of saturnism. Along with the decreased I(131) absorption, a slow-down of hormone formation and of their appearance in the blood could be observed. The weakening of the functional activity of the thyroid gland was directly related to the severeness of intoxication.

EFFECTS-PLANTS AND LIVESTOCK

16932 APTIC NO. 34713

Abeles, F. B., L. E. Forrence, and G. R. Leather

ETHYLENE AIR POLLUTION. EFFECTS OF AMBIENT LEVELS OF ETHYLENE ON THE GLUCANASE CONTENT OF BEAN LEAVES. *Plant Physiol., 48(4):504-505, Oct. 1971. 16 refs.*

Since glucanase induction is ethylene-sensitive, the possibility was examined that chronic low levels of ethylene disrupted the ability of additional quantities of ethylene to induce glucanase activity. Bean plants were grown in 0.6 cu m plastic chambers located in a greenhouse equipped with carbon filters to remove ozone. The two l/min air supply for the chambers was passed through a column of potassium permanganate, absorbed on aluminum pellets. In addition to changes in glucanase levels, it was noticed that plants grown in unfiltered air had smaller leaves and shorter internodes than those grown in filtered air. A three day exposure of leaves to ethylene doubled glucanase activity. Automobiles account for 90% of the ethylene released in the air.

16933 APTIC NO. 34374

Allen, L. H., Jr., S. E. Jensen, and E. R. Lemon

PLANT RESPONSE TO CARBON DIOXIDE ENRICHMENT UNDER FIELD CONDITIONS: A SIMU-

LATION. *Science, 173(3993):256-258, July 16, 1971. 12 refs.*

A comprehensive soil-plant-atmosphere computer simulation model (SPAM) predicted up to a 45% increase in carbon dioxide uptake by a crop enriched with CO2 at ground level. Enrichment rates of 225 and 450 kg/CO2/ha/hr were used. The simulations covered a wide range of wind speed, crop height, and leaf display area. Efficiency of uptake, i.e., the increased CO2 uptake divided by total added CO2, was never greater than 10% and only about two percent for tall, open vegetation with normal leaf display at high wind speeds. Carbon dioxide enrichment under normal field conditions would be very inefficient because of the rapid loss of added CO2 to the atmosphere and the resulting small buildup of CO2 near the leaves of the top canopy where most light is available.

16934 APTIC NO. 34867

Bischoff, O. and Fr. Haun

POISONING OF DOMESTIC ANIMALS THROUGH COPPER AND ARSENIC CONTAINING FLY DUST. *Deut. Tieraerztl. Wochenschr., 17(28):442-447, July 15, 1939. 8 refs. Translated from German. 19p.*

Several weeks after reactivation of a copper smelter on the border between the states of Hesse and Westphalia, cattle, horses, chickens, and sheep in the area exhibited symptoms of poisoning. Subsequently, many animals died or had to be slaughtered. The poisoning was traced to the copper and arsenic-containing fly dust emitted by the smelter and deposited on plants and grasses in grazing pastures, particularly in the presence of dew and fog. Early clinical symptoms of poisoning included conjunctivitis, stomach and intestinal catarrh, secretion of saliva, miscarriages, emphysematose foeti, retention of afterbirths, and reduction or complete stoppage of milk production. Autopsies of deceased or slaughtered animals revealed considerable enlargement of the liver. Liver copper concentrations were 80 mg/kg in cattle and horses and 75-250 mg/kg in sheep. Plant fly dust contained 2.5% copper and 23 mg arsenic trioxide (As_2O_3). Symptoms first appeared in animals 0.5-1.5 km from the smelter, but animals grazing as far away as 4.5-5 km were also affected. Of 2160 cattle in the four communities closest to the smelter, 520 animals perished. Milk production in the four communities was reduced by about 75%. Copper levels in animals and animal organs (liver, Kidney, spleen, heart, blood) are tabulated.

16935 APTIC NO. 34856

Bleasdale, J. K. A.

ATMOSPHERIC POLLUTION AND PLANT GROWTH. *Nature (London), 169(4296):376-377, March 1, 1952. 3 refs.*

Ryegrass grown in a greenhouse receiving purified air had a considerably higher dry weight than ryegrass grown in a greenhouse receiving outside air containing 0.01-0.06 ppm sulfur dioxide. No sign of leaf damage was detected in the greenhouse with polluted air. Pollution thus appears to decrease growth rate, even in the absence of visible leaf injury.

16936 APTIC NO. 34366

Bohne, H.

FLUORIDES AND SULFUR DIOXIDES AS CAUSES OF PLANT DAMAGE. *Fluoride Quart. Repts., 3(3):137-142, 1970. 8 refs.*

Fluoride and sulfur trioxide levels were determined in three industrial areas of Germany where plant damage had been attributed to sulfur oxides. In each area, necrotic lesions on leaf margins exhibited the shades of brown that are typical of fluoride damage. Chemical analyses of the plants supported these observations. Fluoride levels in gladioli ranged from 3.4 to 8.7 mg%, and SO3 levels ranged from 0.77 to 1.15%. Leaves of other plants also showed unusually high fluoride levels, indicating that the gaseous combustion products containing F compounds cause most of the damage in horticulture, farming, and forestry.

16937 APTIC NO. 34830

Dawson, Alden B.

THE HEMOPOIETIC RESPONSE IN THE CATFISH, AMEIURUS NEBULOSIS, TO CHRONIC LEAD POISONING. *Biol. Bull. 68(3):335-346, 1935. 12 refs.*

With prolonged exposure to a solution of lead acetate, definite evidence of absorption of lead was obtained in the catfish. The surface mucus did not constitute an efficient barrier to the entrance of the metal. The degree of destruction of the erythrocytes was used as a measure of the rate of the absorption of lead. Following the early evidences of injury to blood cells, a mild regenerative response occurred, but eventually a pronounced secondary anemia was produced. Little phagocytosis of dead cells occurred in the peripheral circulation, but a progressive storage of the pigment derived from dead red blood cells was found in the interstitial tissues of the liver, spleen, and mesonephros. The hepatic cells also became crowded with pigment granules. No storage was observed in the heart. The pigment was accumulated chiefly in macrophages of local origin which, after ingesting erythrocytes, desquamated and migrated into the connective tissue. Monocytes and eosinophiles increased slightly in number in the blood stream, but the most striking change occurred in the numbers of atypical thrombocytes, and spindle cells which may belong to the thrombocytic series. The endothelium of the heart showed marked proliferative activity. In some regions there was localized differentiation of erythrocytes. In other regions the atypical elongated cells were formed in large radiating clusters on the surface of the ventricular trabeculae. No explanation of the latter response to lead poisoning can be given. (Author summary modified)

16938 APTIC NO. 34878

Dobrovolskiy, I. A.

THE EFFECT OF INDUSTRIAL SMOKE AND GAS EMANATIONS FROM THE KRIVOY ROG IRON ORE EXPLOITATION AREA ON PLANT GROWTH. *(Vliyaniye dymo-gazovykh vydeleniy promyshlennykh predpriyatiy krivorozhskogo zhelezorudnogo basseyna na rasteniya). Text in Russian. Polska Akademia Nauk. Zaklad Badan Naukowych Gornoslaskiego okregu Przemyslowego. Mater. Miedzynarodowej Konf., Wplyw zanieczyszczen Powietrza na lasy, 6th, Katowice, Poland, 1968, p. 257-260. (Sept. 9-14.)*

The Krivoy Rog iron ore field is located within the Steppe region of the Ukraine, characterized by 408 mm of precipitation per year, by an average deficit of humidity of 3.5 3.8 mm, a minimum temperature of -32 C, occurring in January, and a maximum temperature of 39 C, occurring in July. Sulfur dioxide, hydrogen sulfide, nitrogen oxides, carbon monoxide, ammonia, soot, and dust constitute the main air pollutants of this region. Their presence may be perceived at more than 50 km distance from their emission source. Leaf burn and decrease in leaf size, as well as a 40-85% decrease in sprout and an inhibition of flowering and fruit bearing are among the main damaging effects produced on plants. No plants seem to resist the damaging effects nearby the chemical coke industries. A considerable decrease in photosynthesis and catalase activities as well as an inhibition in the excretory function of the flowers is observed in all plant species grown within the polluted regions. The coniferous species as well as the lime and plum-tree appear to be the most susceptible species to sulfur or nitrogen oxide containing gases. The apricot and the white acacia trees appear to be the most resistant species to these pollutants.

16939 APTIC NO. 34901

Fairhill, Lawrence T. and John W. Miller

A STUDY OF THE RELATIVE TOXICITY OF THE MOLECULAR COMPONENTS OF LEAD ARSENATE. *Public Health Rept., (U. S.), vol. 56:1610-1625, Aug. 8, 1941. 25 refs.*

The ingestion of lead arsenate by rats was investigated over a period of two years to determine whether the lead or arsenic components of the molecule was responsible for the toxicity of the substance. Calcium arsenate, lead arsenate, or lead carbonate was fed daily in 10-gram rations to the rats. The order of toxicity was calcium arsenate, lead arsenate, and lead carbonate in order from highest to lowest. Pathologic studies showed significant changes in the kidney and spleen. The large hyperregenerative cells with large vesicular nuclei and cytoplasmic brown pigment granules in the renal convoluted tubules were most frequent in rats fed lead carbonate, less with lead arsenate, and least with calcium arsenate. The large oxyphil intranuclear inclusions appeared in the same order in the animals fed lead carbonate and lead arsenate but were absent in the calcium arsenate group. This seems to indicate that lead is the causative agent for these reactions. Splenic hemosiderosis occurred in greater amounts in the rats fed calcium arsenate and lead arsenate than in those fed lead carbonate. The distribution of lead and arsenic in the tissues of the one- and two-year groups indicated less storage of lead than of arsenic in the soft tissues of animals fed lead arsenate. The kidney content of arsenic in the calcium arsenate group was distinctly greater than that of the lead-arsenate group. With reference to the two lead compounds studied, there was a greater degree of lead deposition in the tissues of rats given lead carbonate than in those given lead arsenate. This was apparent in the case of bone-deposited lead, where pratically twice as much lead was deposited in the bones of the lead carbonate group as in the lead-arsenate group. Since bone-deposited lead is a safer index than lead deposition in soft tissues, it appeared that the arsenate radical either decreases the absorption or increases the excretion of lead. (Author conclusions modified)

16940 APTIC NO. 34359

Grosso, J. J., H. A. Menser, G. H. Hodges, and H. H. McKinney

EFFECTS OF AIR POLLUTANTS ON NICOTIANA CULTIVARS AND SPECIES USED FOR VIRUS STUDIES. *Phytopathology, 61(8):945-950, Aug. 1971. 17 refs.*

Three tobacco cultivars (Nicotiana tabacum) and two Nicotiana species, used for virus identification studies, were tested for susceptibility to ozone, sulfur dioxide, and a mixture of both gases. Nicotiana rustica var. brasilia was the most susceptible cultivar to injury from individual gases, the gas mixture, and ambient polluted air. It displayed from 25-75% leaf injury when exposed to increasing ozone doses (10-30 pphm). Ozone injury to N. glutinoasa fumigated at the same doses ranged from 10-60%. Samsun, Samsun (NN), and Xanthi cultivars were more resistant to ozone than N. rustica var. brasilia or N. glutinosa. Sulfur dioxide (ca. 45 pphm) added to an ozone (ca. 3.0 pphm) atmosphere induced a synergistic response evidenced as injury to all cultivars and species. Mixed gas injury was more acute on N. glutinosa and N. rustica var. brasilia than on Samsun, Samsun (NN), and Xanthi. Samsun and Samsun (NN) were more susceptible to sulfur dioxide (125 pphm) than N. glutinosa and Xanthi. Fumigations produced two injury syndromes: light or dark punctate flecks on upper leaf surfaces; or bifacial tissue collapse. (Author abstract modified)

16941 APTIC NO. 34586

Guderian R., H. van Haut, and H. Stratmann

PLANT DAMAGING HYDROGEN FLUORIDE CONCENTRATIONS. *(Pflanzenschaedigende Fluorwasserstoff-Konzentrationen). Text in German. Umschau (Frankfurt), 71(21):777, 1971.*

Important plants were exposed to defined concentrations of hydrogen fluoride in small greenhouses made of synthetic foil. Spruce, Weymouth pine, Nordmann fir, mountain-ash, and red beech trees showed heavy leaf damage after several days of exposure to concentrations of 1.3 microgram HF/cu m air. After long-term exposure, the growth rate of these species would be retarded. Maple, juniper, jew, and cypress were relatively resistant. The black pine showed weak necrosis on the tips of the needles after 10 days of exposure to an average concentration of 4.2 microgram HF/cu m air. At concentrations of 0.85 microgram HF/cu m air, clover and some types of grass stored 8.7 mg HF/100 g dry substance. At only a slightly higher concentration of 1.1 microgram HF/cu m air, up to 28 mg fluorine/100 g dry substance was found. Winter barley showed sure signs of growth retardation after 12 days of exposure to 3.3 microgram HF/cu m air. Oats, yellow sweet lupine, and peas began to show growth retardation at concentrations above 4.0 microgram HF/cu m air. Some tulips, narcissas, hyacinths, and crocusses showed severe injuries after 12 days of exposure to 1.5 and 2.0 microgram of HF/cu m air. Gladioli and begonias showed leaf injuries at concentrations of less than 1.0 microgram HF/cu m air. Chrysanthemums, rhododendrons, snap dragons, lupines, and carnations were considerably more resistant.

16942 APTIC NO. 34455

Hill, D. J.

EXPERIMENTAL STUDY OF THE EFFECT OF SULPHITE ON LICHENS WITH REFERENCE TO ATMOSPHERIC POLLUTION. *New Phytol., 70(5):831-836, Sept. 1971. 13 refs.*

The relative sensitivity of three lichens to sulfite solutions matches their relative sensitivity to atmospheric pollution as observed in the field. If it is assumed that exposure to sulfite is equivalent to exposure to sulfur dioxide, this result is the first direct experimental evidence which supports the conclusion that SO2 is the substance in pollution that governs the distribution of lichens. Usnea subfloridana is fruticose, Parmelia sulcata foliose, and Lecanara conizaeoides crustose. Fruticose and foliose lichens tend to be more sensitive to atmospheric pollution than crustose lichens. These differing sensitivities to sulfite were correlated with the known sensitivities of these lichens to atmospheric pollution. Sulfate was less toxic than sulfite. Sulfite was toxic at a four pH and below but not toxic at pH five and above. (Author summary modified)

16943 APTIC NO. 34399

Hofstra, G. and R. Hall

INJURY ON ROADSIDE TREES: LEAF INJURY ON PINE AND WHITE CEDAR IN RELATION TO FOLIAR LEVELS OF SODIUM AND CHLORIDE. *Can. J. Botany, 49(4):613-622, April 1971. 7 refs.*

Leaf injury to pine and white cedar trees adjacent to highways in Ontario was investigated and the results were correlated with distance from highway, leaf content of chloride and sodium, and wind direction. Foliar injury, measured quantitatively as the ratio of brown to total leaf tissue, and foliar levels of sodium and chloride higher than background levels were determined on trees up to 120 m from the highway, particularly on the downwind side, on the windward side of the tree, and on trees in exposed positions; leaf injury and content of sodium and chloride decreased with increasing distance from the highway. Salt applied to highway in the winter, wind, and lower than average temperatures contributed to the damage. Leaf injury was also correlated with species of tree examined. (Author abstract modified)

16944 APTIC NO. 348810

Johnels, A. G. and T. Westermark

MERCURY CONTAMINATION OF THE ENVIRONMENT IN SWEDEN. *In: Chemical Fallout. Morton W. Miller and George G. Berg (eds.), Springfield, Ill., Charles C. Thomas, 1969, Chapt. 10, p. 221-239. 21 refs.*

Mercury and mercury compounds have a wide use in agriculture and industry, and an increase in natural levels of mercury content has been recorded. The mercury content in feathers of

11 terrestrial bird species, particularly goshawks, was studied by activation analysis, in material derived from museum collections and living or freshly killed birds and covering a period of more than 100 years. Nearly constant mercury levels were found from the middle of the 19th century until 1940. After that, an increase in mercury concentration occurs, amounting to at least 10 to 20 times the previous level. In 1940 alkylmercury compounds began to be used as seed dressings, indicating that this is the main source of terrestrial contamination. Activation analysis of the mercury content in axial musculature of the pike was used to estimate the level of mercury in the aquatic environment. The mercury concentration factor in pike is 3000 or more. There are indications that mercury appears as an airborne pollutant, mainly affecting the aquatic environment. A number of sources of mercury contamination including fuel burning, fertilizing, and industrial processes, are discussed; in many areas human activities have raised the mercury level of the environment far above natural levels. (Author abstract modified)

16945 APTIC NO. 34831

Jones, J. R. Erichsen

THE RELATIVE TOXICITY OF SALTS OF LEAD, ZINC AND COPPER TO THE STICKLEBACK (GASTEROSTEUS ACULEATUS L.) AND THE EFFECT OF CALCIUM ON THE TOXICITY OF LEAD AND ZINC SALTS. *J. Exp. Biol., vol. 15:394-407, 1938. 10 refs.*

Lethal concentration limits were determined for lead, zinc, and copper for the three-spined stickleback. The addition of calcium salts to solutions of lead nitrate or zinc sulfate reduced the toxicity of these salts to the fish. Fifty mg/l of Ca was sufficient to annul the toxicity of a 0.000001 g/cu cm solution of lead or a 0.000002 g/cu cm solution of zinc. The reactions of the fish in the solution with and without calcium were compared and the respiratory symptoms were described with the aid of graphs illustrating the variation in respiratory rate during the survival time. A running supply of hard tap water containing approximately 50 mg/l of calcium as calcium bicarbonate was harmless to the minnow and the stickleback, when it also contains the maximum amount of lead that it can hold in solution seven times 10 to the minus seventh power g/cu cm). This concentration of lead in soft water is fatal to Gasterosteus in 38.5 hr. The same amount of calcium renders a 0.0000010 g/cu cm solution of lead harmless to the goldfish. Thus, in the presence of sufficient calcium, the interaction between the lead or zinc, and the mucus secreted by the fish does not take place. This conclusion was endorsed by experiments in vitro on the slime secreted by the eel. The application of these results to the pollution of natural water by effluents from lead and zinc workings was briefly discussed. (Author summary modified)

16946 APTIC NO. 34797

Kloke, Adolf and Klaus Riebartsch

CONTAMINATION OF CULTURED PLANTS BY LEAD FROM AUTOMOBILE EXHAUSTS. *(Verunreinigung von Kulturpflanzen mit Blei aus Kraftfahrzeugabgasen). Text in German. Kurze Originalmitteilungen, 51(15):367-368, 1964. 4 refs.*

Pollution of the air and of the vegetation by lead is on the increase, caused almost exclusively by automotive traffic. According to the German DIN-norms, gasoline must not contain more than 0.06% tetraethyl lead, and preferably not more than 0.05%. It is estimated (basis 1963) that in the U.S.A. 600 tons of lead/day enter the atmosphere with exhausts. Tests made in the U.S.A. in the vicinity of highways have shown lead contents of up to 300 micrograms, compared to a normal value of five to ten micrograms/g of dry grass substance. If such grass with high lead content is used as fodder, lead poisoning occurs with the cattle, and considerable quantities of lead may then be contained in the milk. Tests made in Berlin in 1963 with grass samples from locations near highways with heavy traffic showed about 50 micrograms of lead/g of dry substance on the grass blades, and similar maximum values in the roots. In the case of the blades, most of the lead could be easily washed off, which shows that very little absorption took place. The roots also contained up to about 50 micrograms of lead/g of dry substance. The lead was apparently absorbed via the soil into the interior of the root. This phenomenon has been observed with plants in general. It seems that very little of the lead absorbed in the roots of plants is transferred to the leaves.

16947 APTIC NO. 34750

Lavrinenko, D. D.

PINE WOOD CULTURES GROWN ON PLOW SOLES: THEIR BIOLOGICAL RESISTANCE AND METHODS FOR ITS IMPROVEMENT. *(Biologicheskaya ustoychivost sosnovykh kultur na staropakhotyakh i puti yeye povysheniya). Text in Russian. Polska Akademia Nauk. Zaklad badan naukowych Gornoslaskiego okregu Przemyslowego, Mater. Miedzynarodowej Konf., Wplyw zanieczyszczen powietrza na lasy, 6th, Katowice, Poland, 1968, p. 439-446. (Sept. 9-14.)*

The poor qualities of plow soles in terms of conditions for the growth of pine woods are reviewed. They consist in a lack in a specific mesofauna and microflora as well as in the presence of decreased amounts of microscopic fungi and poor nitrifying processes as compared to the soils on which pine tree forests usually grow. Because of a considerable decrease in self-defense capabilities of the pine tree grown on plow soils, the dangers of exposure to parasites and disease are enhanced. To improve the conditions of pine wood development on such soils, the creation of mixed pine and leaf-bearing tree cultures is recommended. Agrotechnical procedures such as in-depth pre-treatment (40, 50, 60 cm) of these soils would allow the pine tree to develop a deep root system which would improve its biological resistance.

16948 APTIC NO. 34514

Macdowall, F. D. H. and A. F. W. Cole

THRESHOLD AND SYNERGISTIC DAMAGE TO TOBACCO BY OZONE AND SULFUR DIOXIDE. *Atmos. Environ., vol. 5:553-559, 1971. 7 refs.*

Fumigation of greenhouse-grown tobacco with ozone confirmed the approximately 20 pphm/hr threshold dose observed in the field. The threshold dose of sulfur dioxide was an order of magnitude higher, near 300 pphm/hr. Synergistic action between the two toxicants was especially pronounced at their combined threshold doses. Synergism also occurred at subthreshold doses of SO2, but not at subthreshold doses of 03 or at SO2 doses lower than the 03 threshold. Thus the low 03 threshold observed in the field was not invalidated by field SO2 concentrations averaging six pphm/hr.

16949 APTIC NO. 34497

Masek, Vaclav

NEW FINDINGS CONCERNING THE PROPERTIES OF FLY DUST FROM COKING PLANTS. INFLUENCE ON THE BIOLOGICAL PROCESSES OF THE PLANT. *(Neue Erkenntnisse ueber die Eigenschaften des Flugstaubes aus der Kokerei. Einfluss auf biologische Prozesse der Pflanzen). Text in German. Wasser, Luft Betrieb, 15(11):417-421, Nov. 1971. 12 refs.*

The hydrolysis of starch with amylasis in the presence of fly dust samples from coking plants as well as the hydrolysis of albumen with pepsin at 37 C was studied. Three different fly dust samples were used containing 15.12, 13.14, and 14.56% by weight ash; 22.05, 12.19, and 4.16% volatile substance; 10, 168 and 6 micrograms soot/g dust; and 3, 98, and 2 micrograms benzo(3-4)pyrene/dust. The fraction of particles below 5 micron was 6.6, 1.4, and 3.1% by weight; between 5 and 10 micron, 32.5, 6.5, and 20.4%, and between 10 and 50 micron, 58.1, 16.1, and 57.2% by weight. The influence of these dust samples on the enzymatic reactions was studied by inversion of saccharosis with invertasis in a buffered environment. None of the three dust samples influenced the enzymatic reactions. The influence of these fly dust samples on the intensity of photosynthesis of young bean plants immediately after the appearance of the first leaves was also studied. By comparison with a plant grown under optimum conditions, it was found that the dust reduces the chlorophyll content. The fine-grain dust adheres to the leaves so that the grain size fraction is of major importance. Only very little of the nutritive substances of the dust samples were taken in by the plants. The total growth and the growth speed was hardly influenced by the dust samples. The toxicity of the aqueous dust extract was tested by determination of the germination index and the root growth. All three dust samples were toxic.

16950 APTIC NO. 34849

Menzel, R. G.

SOIL-PLANT RELATIONSHIPS OF RADIOACTIVE ELEMENTS. *Health Phys., vol. 11:1325-1332, 1965. 97 refs.*

When a radioactive element is added in a soluble form to soil, its concentration in plants growing in the soil may be much greater or much less than its concentration in the soil. Relative concentration factors are given for a number of elements. Those that are highly concentrated in plants are alkali metals, halides, or essential nutrient elements. Most of the salts of these elements are very soluble in water. Elements that, after addition to soil, are slightly more concentrated in plant tissues are the lighter alkaline earths, the higher analogues of sulfur, and certain micronutrient elements. Elements neither more nor less concentrated in plants than soil are the remaining alkaline earths and halides, silicon, and some micronutrients. Elements that are less concentrated in plants than soils include iron and cesium. Most elements that are strongly rejected by plants are of very limited solubility. Gama radiation doses to plants would come predominantly from the soil, as would beta radiation doses except for those few elements highly concentrated in certain plant tissues. The role of plants in movement of radionuclides in soil is minor except over long periods of time.

16951 APTIC NO. 34307

Quinche, J. -P, A. Bolay, and R. Zuber

RADICULAR ABSORPTION OF FLUOBORATE BY APRICOT TREES. *(L absorption radiculaire du fluoborate par l abricotier). Text in French. Revue Suisse de Viticulture et Arboriculture (Lausanne), 3(3):62-70, May-June 1971. 4 refs.*

Experiments conducted on apricot trees in the canton of Valais in Switzerland over a two year period were designed to determine the degree of absorption of potassium fluoborate, introduced into the soil either in the form of pure KBF4 or by a commercial fertilizer contaminated with KBF4, by the tree roots. The roots absorbed KBF4 very eagerly with a resulting strong accumulation of fluorine and a less important accumulation of boron in leaves. Only small but clearly detectable amounts of fluorine penetrated into apricots. Boron, on the other hand, can attain relatively high levels in the fruits. The percentage of necrotized ripe apricots is a linear function of the amount of KBF4 introduced into the soil. Thus, only commerical fertilizer free of KBF4 can be used in orchards. The extent of leaf necrosis was a linear function of the logarithm of the leaf fluorine or boron content, and thus of the KBF4 quantity in the soil.

16952 APTIC NO. 34703

Thomas, Moyer D. and George R. Hill, Jr.

ABSORPTION OF SULPHUR DIOXIDE BY ALFALFA AND ITS RELATION TO LEAF INJURY. *Plant Physiol., vol. 10:291-307,, 1935. 8 refs.*

The amount of sulfur dioxide absorbed by the leaf tissue of alfalfa was measured in a considerable number of fumigation treatments. As a first approximation, the extent of leaf destruction is a linear function of the amount of SO2 absorbed in a given time period. The amount of leaf destruction attending a given amount of absorption increases as the rate of absorption is increased. An absorption factor, A, which depends on the activity of the leaf in taking up the gas, is discussed. If this factor is constant in a series of experiments, the absorption equation can readily be transformed into time-concentration exposure equations. Further, it is possible to calculate from the absorption equations the exposure condition for any specified amount of leaf destruction or value of A. The evidence indicates that when the rate of absorption exceeds a certain threshold value, a specified amount of injury appears in a time which is proportional to the difference between the actual rate of absorption and the threshold rate. Assuming that the lethal dosage of sulfur dioxide is added to the leaf instantaneously, and that it is all absorbed by the mesophyll cells, which represent about one half of the leaf substance, the limit of tolerance to the gas of these cells is approximately 2700 ppm in dry tissue, and 540 ppm in fresh tissue. (Author summary modified)

16953 APTIC NO. 34941

Todd, J. R.

NOTES ON THE USE OF CALCIUM VERSENATE IN ACUTE LEAD POISONING. *Vet. Rec., vol. 69:31-32, 1957. 5 refs.*

Case histories of three outbreaks of lead poisoning in calves are described, in which calcium versenate treatment was effective in four animals out of five. As calcium versenate combines with roughly half its weight of lead, at least 10 to 20 g would be required to combine with a lethal dose of lead. An initial treatment of six g calcium versenate may be effective if sublethal amounts of lead have been ingested, or may be sufficient to reduce the tissue concentration below the toxic level in cases where lethal amounts have been ingested.

16954 APTIC NO. 34997

Wilton, A. C., J. J. Murray, H. E. Heggestad, and F. V. Juska

TOLERANCE AND SUSCEPTIBILITY OF KENTUCKY BLUEGRASS (POA PRATENSIS L.) CULTIVARS TO AIR POLLUTION: IN THE FIELD AND IN AN OZONE CHAMBER. *J. Environ. Quality, 1(1):112-114, Jan.-March 1972. 13 refs.*

During the late summer and autumn of 1970, differential injury, believed to be due to air pollution, was observed on five Kentucky bluegrass (Poa pratensis L.) cultivars: Merion, Kenblue, Windsor, 117-27-6, and Belturf. Belturf was injured most, 117-27-6 least, and the other three cultivars were intermediately damaged. Damage was less severe on parts of plots fertilized with nitrogen at 293 kg/ha than on parts of plots fertilized with 146.5 kg/ha of N. Subsequent tests of three of these cultivars in an ozone chamber (30 pphm for two and four hours) showed cultivar injury ratings corresponding to field injury ratings. Belturf was most severely injured, Windsor next, and 117-27-6 least. Differences among cultivars were highly significant at both levels of ozonation. Injury was significantly greater when ozone was applied at 30 pphm for four hours, than at the same level for two hours. The 117-27-6 was unique in that it tolerated ozone considerably better than did previously investigated Kentucky bluegrass cultivars. The chance selection of this extremely tolerant cultivar was possibly related to its having been selected from M3 progeny of irradiated Merion seed. Bluegrass may build up some tolerance to repeated ozone treatments. (Author abstract)

EFFECTS-MATERIALS

16955 APTIC NO. 34396

Abe, Hiroshi, Yoko Ishii, and Hiroyuki Kato

EVALUATION OF ATMOSPHERIC FACTORS BY ANALYSES OF CORROSION PRODUCTS AND SURFACE DEPOSITS ON COPPER PLATES. *Railway Tech. Res. Inst. Quart. Repts., 12(3):170-174, Sept. 1971.*

With the purpose of investigating atmospheric pollutants by the physical and chemical analysis of corrosion products and deposits on the surface of metals, exposure tests of copper specimens were carried out for two years at different contaminated sites (marine, rural, urban, industrial and residential areas). As a result of the measurements, corrosion products in the atmosphere were successfully grouped as sulfide-, basic sulfate-, and basic chloride-groups. Sulfides were the most detrimental to copper alloy. Principal deposits on the specimens were soil, ferric oxide particles, and sodium chloride. The ratio of weight loss due to corrosion to weight difference before and after the exposure could be a measure of contamination rate. (Author abstract)

16956 APTIC NO. 34765

Bassett, Emery, Henry Frankel, and Raymond Grenley

DESIGN AND MONITORING OF MULTIPLE AND VARYING POLLUTANT CONCENTRATION. *Preprint, American Chemical Society, Washington, D.C., Div of Water, Air and Waste Chemistry, p. 93-98, 1970. 1 ref. (Presented at the American Chemical Society, Divsion of Water, Air, and Waste Chemistry, Chicago, Ill., Sept. 13-18, 1970.)*

A variety of environments were simulated to study their effects on the reliability of electronic components. The atmospheres ranged from the reducing atmosphere of the northeast to the oxidizing atmosphere of Los Angeles. Industrial atmospheres using such corrosive gases as chlorine and easily decomposed gases (such as hydrogen sulfide) were also simulated. A major component of the simulation system was a gas chromatograph, while the environmental chambers were analyzed by a vacuum technique that maintains a continuous flow of gas for sampling.

16957 APTIC NO. 34606

Burkhardt, W.

STATE OF THE ART AND ASPECTS OF SURFACE AND CORROSION PROTECTION TECHNOLOGY. PART 1. *(Stand und Aspekte der Oberflaechen- und Korrosionsschutztechnik. (Teil 1)). Text in German. Technik (Berlin), 26(11):697-704, Nov. 1971. 17 refs.*

All corrosion is caused by the effect of the environment on metals, metal alloys, and metallic protective layers. Two stages can be distinguished in the process: chemical corrosion in dry, gaseous media wherein primarily a reaction between the metal and the oxygen of the air occurs, other corrosive gases being hydrogen, sulfur dioxide, and chlorine; and the active electrochemical losening of metal. The influencing factors of atmospheric corrosion are temperature and temperature changes; moisture and precipitation; solar radiation; cloudiness; wind; and the concentration of the atmosphere of 0, SO2, CO2, Cl, H2S, NH2, NH3, soot, and dust. The corrosive attack is accelerated when the relative humidity rises above 70%. With relative humidities between 70 and 85% the type and concentration of pollution has an accelerating influence. The corrosion speed in micron/a to the minus first power for iron is 5/60 in rural air, 30/70 in urban air, 40/160 in industrial air, and 60/230 in marine air; for lead, it is 0.7/1.4 in rural air, 1.3/2.0 in urban air, and 1.8/3.7 in industrial air.

16958 APTIC NO. 34321

Egan, F. J.

EFFECT OF ENVIRONMENTAL FACTORS ON THE CORROSION OF STEELS. *Australasian Corrosion Eng., 15(6):9-16, July 1971. 16 refs. (Presented at the Australasian Corrosion Association Symposium, Wollongang Branch, Wollongong, Australia, July 19, 1971.)*

The effect of environmental factors, including rain and atmospheric pollutants, on exposed steel are examined. The amount of moisture and sea air are a function of geographical location, but rain, humidity, and sea salts cause rusting and speed corrosion. Dusts, e.g., carbon smoke, sulfurous gases, and ammonium salts are additional factors in steel corrosion. Pollutants dissolved in rainwater increase the pH value and aggravate corrosive effects. Corrosion will be more severe in an atmosphere continually saturated with water and containing carbon particles, chlorides, and sulfates. The effect of alloying steel on corrosion resistance is discussed.

16959 APTIC NO. 34339

Engelhardt, Reiner, Ute Rasemann, Hartmut Baum, Heinz Boudroit, and Egon Kunze

STUDY OF THE RUST STRUCTURE OF LOW-ALLOY STEEL. *(Untersuchungen zur Roststruktur an niedriglegierten Staehlen). Text in German. Neue Huette, 16(9/10):593-597, Sept./Oct. 1971. 10 refs.*

Low-alloy steel samples were exposed to an atmosphere with varying relative humidity. Sulfur dioxide was added discontinuously. Three steel types were examined. The exposure of the samples at 76% relative humidity caused no changes of the diffraction pattern. Corrosion resistant low-alloy steel, Corten steel, and a comparative none-alloyed steel sample were exposed to the open atmosphere. Examinations of the rust layer after 6, 12 and 18 months revealed a direct influence of the climatic conditions as well as of the steel composition. The thickness of the rust fluctuated between 5 and 7 micron. Salt depositions were found both on the corrosion resistant low-alloy steel as well as on the none-alloyed steel. They were identified as iron sulfate. The quantity found on the steel sample was in relation to the SO2 content of the atmosphere. A 20 to 40% enrichment of sulfur was found in the rust with respect to the atmospheric SO2 concentration.

16960 APTIC NO. 34820

Hermance, H. W., C. A. Russell, E. J. Bauer, T. F. Egan, and H. V. Wadlow

RELATION OF AIR-BORNE NITRATE TO TELEPHONE EQUIPMENT DAMAGE. *Preprint, American Chemical Society, Washington, D. C., Div. Water, Air and Waste Chemistry, p. 113-117, 1970. 3 refs. (Presented at the American Chemical Society, Division of Water, Air and Waste Chemistry, Chicago, Ill., Sept. 13-18, 1970.)*

In 1959 nickel brass wire springs supporting contacts on telephone relays began breaking off in the Los Angeles area. This breakage was found to be due to a stress corrosion cracking when the wire spring was anodic because of nitrates present in dusts deposited by the surrounding air. Laboratory tests showed that the crack growth was very slow at relative humidities of less than 50%. It was therefore decided to maintain humidities below this level in susceptible locations and to install 95% National Bureau of Standards rated filters to combat further dust accumulation. Nitrate deposition was measured. Representative relays were sampled in the various central offices in the Los Angeles area. The offices were then given a nitrate rating based on the average accumulated nitrates per unit area with a factor to adjust for the length of exposure in service. Nitrate accumulations in several other cities with known dust and pollution problems were measured. Other types of equipment using nickel-brass components were also affected.

16961 APTIC NO. 35034

Kitahama, Kunio

EROSION OF DESULFURIZING SYSTEM H2S STRIPPER CONDENSER TUBE. *(Datsuryu sochi H2S Stripper condenser tube no fushoku). Text in Japanese. Preprint, Japan Petroleum Inst., Tokyo, p. 85-87, 1971. (Presented at the Seminar Heavy Oil Desulfurization Apparatus, Tokyo, Japan, March 22-23, 1971.)*

A condenser tube of the hydrogen sulfide stripper of Mono ethanol amine scrubber at the Mizushima Refinery was damaged by corrosion. But, in this case, the corrosion was not caused by H2S. Fuel gas and MEA hydrogen sulfide absorbent are sent to the H2S stripper. The vapor is cooled and the H2S is separated in the overhead accumulator. The duplex tube s outer diameter is 19 mm, the material for the outer layer is STB 30, 1.25 t, the inner layer is BSTF 2, 1.25 t. A cross section of the tube showed that the inner BSTF 2 was locally corroded by seawater around the H2S gas inlet nozzle, and the outer material STB 30 was exposed to seawater and the STB layer received galvanic corrosion. The corrosion had evidently started from the inside in the grain boundery because of localized high temperature in the tube. For treatment, the outer layer was replaced with SUS 28 which has a high H2S resistance rate and the inner layer was exchanged with CNTF 1 for its resistance against seawater and against hot spot corrosion.

16962 APTIC NO. 34384

Lambeth, P. J.

EFFECT OF POLLUTION ON HIGH-VOLTAGE OUTDOOR INSULATORS. *IEE (Inst. Elec. Eng.) Rev., 118(9R):1107-1130, Sept. 1971. 123 refs.*

High-voltage insulators may flashover at working voltage when polluted and wet. Pollution deposited by aerodynamic forces may include inorganic (smokes, fumes, dust), organic (bacteria, plant spores, pollens), and water (fog, mist, drizzle, rain) pollution particles. The process of pollution-flashover is examined with respect to electric stress, discharge stability, method and velocity of propagation of discharge, surface conductivity, insulator length, shed profile, stress control, voltage duration, waveform, and effects of pollution on surge diverters and insulators with special duties. Natural and artificial pollution test methods are reviewed. Preventive measures for pollution flashover, including cleaning, live washing, grease, oil baths, and resistive coatings, are examined for efficiency and applicability. Other effects of insulator pollution (radio and television interference, audible noise, corrosion), site pollution severity, and insulation for ultra-high voltage systems are discussed.

16963 APTIC NO. 34652

Salisbury, R. P. and N. Birks

OXIDATION OF IRON-CHROMIUM ALLOYS IN SULPHUROUS ATMOSPHERES. *J. Iron Steel Inst., (London), no. 209:534-540, July 1971. 16 refs.*

Iron-chromium alloys, containing up to 15 wt% of chromium, were oxidized at 800 and 992 C in an atmosphere of argon containing 2.5% sulfur dioxide by volume. The results could be explained by a combination of the features shown by iron-chromium alloys in oxygen and by pure iron in argon-sulfur dioxide atmospheres. The reduced oxidation resistance of iron-chromium alloys in the presence of sulfur dioxide is due to the formation of chromium sulfides at the scale/metal interface which denudes the alloy of chromium. A further factor is the increased transport rate of iron ions through the scale due to the formation of iron sulfide in the case of the low-chromium alloys. (Author abstract)

16964 APTIC NO. 34326

Shishman, D. V.

EXPERIENCE WITH THE USE OF RECTIFIER DISCHARGERS IN POLLUTED AREAS. *(Opyt ekspluatatsii ventilnykh razryadnikov v zagryaznennykh rayonakh). Text in Russian. Elektr. St. (Moscow), no. 9:82-83, 1971.*

Generalized information on the use of rectifier dischargers in polluted areas obtained from 50 power engineering unions is presented. Damage of the device occurred in the presence of various pollutants, mainly under conditions of fog, drizzling rain, wet snow, or during dust storms carrying along salty pollutants. To improve the resistence of these dischargers against pollutant damage, new trends for their design are pointed out. Single element devices for possibly higher voltage should be provided with an elaborate porcelain coated surface. The shape of this coated surface should enhance the washout of pollutants by rain or wind and should allow less pollutants to be deposited. A hydrophobic layer consisting of turbine or converter oil could be useful in highly polluted areas.

16965 APTIC NO. 34493

Smith, Donald L.

SELECTION OF CORROSION RESISTANT MATERIALS FOR COAL DRYER STACK GAS SCRUBBERS. *Materials Protect. Performance, 10(11):16-17, Nov. 1971. 3 refs.*

The wet scrubbers used with Consolidation Coal Company s first thermal dryers were constructed of Type 304 stainless steel. Of 15 units at various preparation plants, only two showed accelerated deterioration. In four years of service, severe general corrosion and pitting had occurred in the upper section of these units. In addition to Type 316 stainless steel, corrosion rates were determined for several other readily available alloys. Of all the metals, only a venturi-type 316 stainless steel scrubber was free of pits after 2070 operating hours. No evidence of stress corrosion cracking was found. In general, both the pitting and corrosion rates increase with distance above the gas inlet. This is due to a buildup of dirt which holds acids from the flue gas in contact with the metal.

16966 APTIC NO. 34588

Vanderbeck, N.

THE WEATHER RESISTANCE OF COPPER AND COPPER ALLOYS. *(Die Wetterbestaendigkeit von Kupfer und Kupferlegierungen). Text in German. Metall (Berlin), 25(11):1299-1303, Nov. 1971. 44 refs.*

Copper and copper alloys generally have an excellent weather resistance. Under certain environmental conditions, however, a special type of corrosion develops on several copper alloys. The corrosive agents may be normal components of the atmosphere such as chloride particles contained in the air over coast lines, the relative humidity, or pollutants such as sulfur dioxide, carbon dioxide, hydrogen sulfide, ammonia, or amines in urban and industrial areas. With the absence of air pollution, invisible oxide spots develop at room temperature with moderate air pollution a film forms on the surface. If copper is exposed to an atmosphere containing traces of hydrogen sulfide, a film forms on the surface consisting of copper sulfide and copper oxide. The film developing speed is proportional to the sulfide content in the atmosphere. The corrosion speed at exposure of copper to an atmosphere polluted by water vapor and sulfur dioxide depends on the sulfur dioxide concentration as well on the relative humidity. For a sulfur dioxide concentration of one percent, the corrosion speed is at a minimum. This fact is due to the composition of the corrosion products. At one per cent the film consists of acid copper sulfate, and below this concentration of alkaline copper sulfate. At a relative humidity is more than 63%, the corrosion speed increases considerably. This is due to the fact that the film is capable of water vapor absorption.

EFFECTS-ECONOMIC

16967 APTIC NO. 34370

PERSPECTIVE. *Chem. Age (New York), 103(2725):11-12, 20, Oct. 8, 1971.*

The removal of lead from gasoline should have little long-term effect on the European chemical industry, although ethylene and aromatics prices may fluctuate between 1975-1980. However, the flexibility of European refineries and improvements in reforming technology could allow increased aromatics production at present costs. Demand for naptha as feed for catalytic reformers may result in a slight tightening of supply. For the petrochemicals industry, this will be offset by the reduced value of low octane light naptha likely to be offered to the industry. Reduction in lead levels will create a $50 million/yr market for catalytic exhaust afterburners and also major opportunities for processes and catalysts to produce alternate octane boosting components. Legislation is being enforced or is impending to control or reduce the amount of lead in gasoline in Sweden, West Germany, France, and the USSR. There are still no lead-free fuels on sale in Europe and only a few reduced leaded fuels, as higher-octane and higher-priced products have been the main priority of oil companies.

16968 APTIC NO. 34970

AN ECONOMIC ANALYSIS OF PROPOSED SCHEDULES FOR REMOVAL OF LEAD ADDITIVES FROM GASOLINE. *Bonner and Moore Associates, Inc., Houston, Texas, Environmental Protection Agency Contract 68-02-0050, 223p., June 25, 1971. 31 refs.*

NTIS: PB 201133

A feasibility study was made of gasoline lead removal schedules. Eleven proposal schedules were grouped into two classes, one related to a two-pump marketing system, the other to a three pump system. The feasibility analysis examined approximate capital costs, pool octane numbers, aromatics concentrations, prime blending component requirements, and year-to-year rates of increase in gasoline volume times octane. The basic study technique employed linear programming models because of their inherent ability to seek out an economic optimum among the myriad and conflicting choices of equipment selection, operating conditions, intermediate feedstock allocation, and finished product blending.

16969 APTIC NO. 34828

Culberson, S. Frank, T. E. Ware, Jr., and John R. Dosher

PRODUCTION OF UNLEADED GASOLINE. *Pace Co. Consultants and Engineers, Houston, Tex., 121p., July 8, 1970. 2 refs.*

NTIS: COM-71-00566

Increased costs of producing reduced-lead or unleaded gasoline were derived for seven combinations of reduced lead and/or octanes for each of three refining situations: a 200,000 barrels-per-stream-day Gulf Coast refinery; a 15,000 B/SD mid-continent refinery; and an 80,000 B/SD west coast refinery. Economics were also developed for two new refineries producing high yields of present specification gasoline (with lead) and 90 research octane number unleaded gasoline, respectively, in order to determine the cost of producing extra volumes of gasoline that would be needed for certain exhaust emission control strategies, e.g., thermal converters and lower-octane gasoline. In general, the costs of reduced-lead gasoline are lower for the 80,000 B/SD refinery, most expensive in the 15,000 B/SD refinery, and intermediate for the 200,000 B/SD refinery. The amount of aromatics and the motor octane number of unleaded gasoline are important factors affecting cost changes. The high production costs in a small refinery would put small refiners at a severe competitive disadvantage and possibly force some closings.

16970 APTIC NO. 34518

Greene, C. H.

POLLUTION COSTS. *Natl. Eng., 75(11):8, Nov. 1971. (Presented at the American Institute of Plant Engineers, Pollution Conference.)*

According to a survey conducted in approximately 3000 manufacturing plants, the leading water pollutants are acid and alkali, settleable solids and oil. Favorite types of air quality treatment equipment include wet scrubbers (38%), fabric filters (33%), and mechanical collectors (31%). Electrostatic precipitators and incineration devices are also used. Estimates of the breakdown of pollution expenses are tabulated. Odors, particulates, and sulfur dioxide are chief air problems.

16971 APTIC NO. 34316

Grossman, Howard

ANTI-POLLUTION EQUIPMENT: BUY OR LEASE? AN EVALUATION OF THE PRESENT PROS AND CONS OF ACQUIRING POLLUTION CONTROL DEVICES VERSUS LEASING POSSIBILITIES. *Rubber Age (New York), 103(11):49-52, Nov. 1971.*

The full technology to solve the various problems in air emission, water emission, and waste disposal can never be fully developed because of changes in industry and process, and no control technique can serve equally all plants in a similar industry. Once equipment has been purchased or financed, the matter of fitting it into a particular installation becomes often a customized job. De-bugging functioning equipment is also a real problem. At a company that plans expansion, it becomes a critical problem to determine how much to commit to anti-pollution controls. The installment purchase of equipment is costly, usually requiring a substantial down payment, and offering no depreciation advantages. Leasing is another alternative many companies are using. It enables a company to obtain just the equipment it wants with a minimal use of its own capital. In addition, leasing permits a company to keep its own funds and normal credit lines intact for profit-producing activities. Other advantages and disadvantages of leasing are cited.

16972 APTIC NO. 34513

Joskow, Jules

MEETING THE COSTS OF ENVIRONMENTAL CONTROL. *Public Util. Fortn., 88(11):31-35, Nov. 25, 1971. 2 refs.*

Of all American industries, the electric utility industry will make the biggest investment in pollution control to bring its facilities up to current standards. The costs are estimated at $3.24 billion or almost five times the projected 1971 expenditure of $679 million. There is some indication that foregone taxes will play some role in the financing of these costs. One use of foregone tax revenues that may be a viable financing source is the sale of tax-exempt bonds. Under an exception in the 1968 Revenue and Expenditure Control Act, local governments are permitted to sell such bonds to finance air and water pollution control facilities. Advantages of this approach for a company are a significant saving in borrowing costs and liberal depreciation rates.

16973 APTIC NO. 34521

Roberts, R. M. and E. M. Wilson

SYSTEMS EVALUATION OF REFUSE AS A LOW SULFUR FUEL: PART I -- THE VALUE OF REFUSE ENERGY AND THE COST OF ITS RECOVERY. *Preprint, American Society of Mechanical Engineers, New York, 9p., 1971. 6 refs. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D. C., Nov. 28-Dec. 2, 1971, Paper 71-WA/Inc-3.)*

The firing of refuse in utility class steam generators of optimum design constitutes a method of disposal that is technically practical, low in cost, conservative of land and mineral resources, and conducive to the lowering of sulfur oxide emissions. As an energy resource, mixed municipal refuse is steadily growing in both heating value and production rate. Its use as a fuel represents a definite form of resource recovery, one that is not incompatible with but, rather, highly complementary to certain forms of recycle, such as the salvage of glass and metals. The resource characteristics of refuse as a fuel are considered, as well as the economics of such use in comparison with conventional disposal techniques. A cost model is developed. Cost data are presented for the turboelectric configurations regarded as optimum for refuse-firing. (Author conclusions modified)

16974 APTIC NO. 34515

Stearn, Enid W.

ENVIRONMENTAL CONTROL FACES COMPROMISE. *Rock Prod., 74(11):66-68, 82-83, Nov. 1971.*

Dust generated in the cement, crushed stone, and lime industry is capable of being controlled to a degree with current technology. Economically, however, the costs of such control will be appreciable and the price structures in the industries will be adversely affected for years to come. Moreover, most modern control techniques risk obsolescence tomorrow. For these reasons the benefits of pollution standards must be weighed against the cost of compliance. Hopefully, local zoning and regulatory powers will give way to national policies that consider environmental costs without deferring to them. Companies, even before they feel the direct effects of regulation, would do well to monitor their pollutants and cut costs in other areas in partial payment of control costs. Enforcement powers of state pollution control agencies are summarized along with tax exemptions granted for control equipment.

STANDARDS AND CRITERIA

16975 APTIC NO. 34377

COMMENTARIES ON NEW EMISSION STANDARDS BY THE REVISED AIR POLLUTION CONTROL ACT. *(Taiki osen boshiho kaisei ni yoru shin ha ishutsu kijunchi to (shiko kisoku no) setsumei). Text in Japanes. Netsu Kanri (Heat Management and Pollution Control), 23(10):54-57, Oct. 1971.*

The maximum allowable concentration of suspended particulates has been greatly reduced by the revised air pollution control act. New emission standards are one third to one tenth of the previous standards in the general categories, and one sixth to one twentieth in special categories. The maximum land surface concentration of sulfur oxide content for the special category area is 0.009 ppm and includes areas where the annual average of suspended particulate concentration is more than 0.15 mg/cu m. In the areas where fuel regulations apply, local ordinances are to set respective standards taking into consideration the areas fuel consumption and seasonal variations. However, the sulfur content of these fuels during combustion is to be within the range of 1.0 to 1.5%. Coke furnaces, mineral depositories, conveyors, crushers, and pulverizer sieves must have dust collection devices, water sprays, and dust cover hoods. Emission standards for sulfur oxides in general and special areas, dusts, and toxic materials such as cadmium, cadmium compounds, chlorine, hydrogen chloride, fluoride, hydrogen fluoride, potassium fluoride, lead, and lead compounds are given by tables.

16976 APTIC NO. 34444

REGULATION FOR THE IMPLEMENTATION OF THE LAW OF JULY 13, 1966, NO. 615 CONTAINING PROVISIONS AGAINST ATMOSPHERIC POLLUTION BY THERMAL POWER PLANTS. (DECREE OF THE PRESIDENT OF THE REPUBLIC 22-12-1970, NO. 1391, SUPPLEMENT TO THE OFFICIAL GAZETTE NO. 59 OF MARCH 8, 1971). *(Regolamento per l esecuzione della legge 13 luglio 1966, N. 615 recante provedimenti contro l inquinamento atmosferico, limitatamente al settore degli impianti termici. (Decreto del Presidente della Repubblica 22-12-1970, n. 1391, Supplemento ordinario alla Gazzetta Ufficiale n. 59 dell 8-3-1971). Text in Italian. Igiene Sanita Pubblica (Rome), 27(5-6):217-238, May-June 1971.*

Standards are discussed for thermal power plants designed for space heating, for water heating, for kitchens, for laundries, for sterilization, for disinfection, for disposal of refuse, for bakeries and similar ovens, and for furnaces with a capacity exceeding 3000 Kcal/hr which do not form part of an integrated industrial complex and which are situated in zones A and B of the Italian national territory. The regulation sets down technical and constructional standards as they apply to thermal power plants in general and to boiler rooms, fuel tanks, stacks, smoke ducts, auxiliary installations, furnaces, burners, mobile gratings, and measuring instruments in particular; it specifies the various technical data which must be included in applications for project approval by the authorities. Maximal permissible particulate emission equals 0.25 g/cu m plus a permitted increase for power plants with a capacity in excess of one million Kcal/hr expressed in percentages. The regulation contains specifications concerning volatile substances, ash content, sulfur content, granulation, and humidity in solid and liquid fuels, guidelines for the sampling of fuels and for their analysis are given.

16977 APTIC NO. 34664

Environmental Protection Agency, Research Triangle Park, N. C., Office of Air Programs

BACKGROUND INFORMATION - PROPOSED NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS: ASBESTOS, BERYLLIUM, MERCURY. *Pub - APTD-0753, 28p., Dec. 1971. 20 refs.*

NTIS: PB 204876

Background information on the derivation of proposed national emission standards for asbestos, beryllium, and mercury is examined with respect to effects of the pollutants on health, nature of the air pollution problem, and the development and economic impact of the proposed standards. Standards for asbestos emissions are expressed in terms of required control practices that limit emissions to an acceptable level. The proposed beryllium standards are designed to protect the public from 30-day average atmospheric concentrations greater than 0.01 microgram/cu m. For short-term periodic exposures, the safe level was determined at 25 microgram/cu m for a 30-minute maximum. Proposed emission standards for mercury should not exceed an average daily concentration of 1.0 microgram/cu m. Atmospheric dispersion estimates used to develop the proposed standards are outlined. These were based on parameters of average wind speed, stability, and wind direction.

16978 APTIC NO. 34392

Axtman, Bill

FEDERAL AIR QUALITY STANDARDS. *Fuel Oil Oil Heat, 30(11):50, 52, 54, 62, Nov. 1971.*

Federal standards to reduce air pollution from stationary sources are outlined with respect to performance tests; review of plans; implementation and enforcement; availability of information; state authority; and standards of performance for fossil-fuel fired steam generators. Fossil-fueled steam generator provisions cover furnaces or boilers fired by any form of solid, liquid, or gaseous fuel containing carbon or hydrocarbons. They also include emission standards for particulate matter, sulfur dioxide, and nitrogen oxides, emission and fuel monitoring demands for smoke detection and continuous monitoring of SO2 and NOx, and test methods and procedures.

16979 APTIC NO. 34866

Joursset, D.

TESTING IN COUNTRIES OF THE EUROPEAN COAL AND STEEL COMMUNITY. *(Normalisation des epreuves fonctionnelles respiratories dans les pays de la Communaute Europeenne du Chabron et de L Acier). Poumon Coeur (Paris), vol. 10:1145-1159, 1960. Translated from French. Translation Consultants, Inc., Arlington, Va., 22p.*

The European Coal and Steel Community has proposed that its six member countries adopt standardized functional respiratory tests, spirographic terminology, and respiratory physiopathological symbols. The recommendations are presented along with the results of a statistical analysis of data from spirographic examinations of 3000 subjects, 18-83, in the six countries. Ventilation values for spirographic measurements should be supplemented by listing ventilatory frequency, and respiratory equivalents are to be expressed in liters of air ventilated per liter of oxygen consumed or carbon dioxide removed. The spirographic method, rather than the Douglas pouch, is preferred for maximum ventilation measurements. The tests are to be recorded for three different frequencies greater than 30/min, the duration of each test running between 15-30 secs. The recommended symbols differ from those proposed in the U. S., especially in that volumes, flows, and concentrations are designated by the same symbols for both gaseous and blood phases. The statistical analysis indicated the need to consider the variation of ventilatory volumes with age. Tables of standard values, as a function of age, vital capacity, residual volume, and forced expiratory volume, were obtained by a statistical filtering out based on constancy of variance with age.

16980 APTIC NO. 34986

Ruckelshaus, William D.

PUBLIC WELFARE. CHAPTER XII - ENVIRONMENTAL PROTECTION AGENCY. PART 1201 -- CONTROL OF AIR POLLUTION FROM NEW MOTOR VEHICLES AND NEW MOTOR VEHICLE ENGINES. OXIDES OF NITROGEN EXHAUST EMISSION STANDARD AND TEST PROCEDURES. *Federal Register, 36(128):12652-12653, July 2, 1971.*

Amendments to a rule on nitrogen oxides exhaust emission standard and test procedures are presented. Nitrogen oxides are defined as the sum of nitric oxide and nitrogen dioxide contained in the gas sample. Emission standards are delineated for hydrocarbons, carbon monoxide, and nitrogen oxides. The exhaust emission test is examined with respect to evaporative emission collection procedure, dynamometer driving schedule and procedure, engine starting and restarting tests, and sampling and analytical systems.

16981 APTIC NO. 34987

Ruckelshaus, William D.

ENVIRONMENTAL PROTECTION AGENCY. (42 CFR PART 420). NATIONAL AMBIENT AIR QUALITY STANDARDS. PREPARATION, ADOPTION, AND SUBMITTAL OF IMPLEMENTATION PLANS. *Federal Register, 36(67):6680-6701, April 7, 1971. 9 refs.*

Directions on the preparation, adoption, and submittal of implementation plans of the national ambient air quality standards for sulfur oxides, particulate matter, carbon monoxide, photochemical oxidants, hydrocarbons, and nitrogen oxides as directed by the Clean Air Act are examined. General provisions of the rules, plan content and requirements, and extension requests are reviewed. The plans must include data on legal authority for implementation and enforcement, control strategies and regulations, emergency action criteria and procedures, air quality surveillance, review of sources, source registration, emission surveillance, and intergovernmental cooperation. Methods of air quality estimation, air pollution control regulations, major pollutant sources, emission inventory summary, point and area source data, projected motor vehicle emissions, and control agency functions are outlined.

LEGAL AND ADMINISTRATIVE

16982 APTIC NO. 34500

A GREAT CONCERN FOR THE ENVIRONMENT. *Metalwork. Econ., 27(11):56-58, Nov. 1971.*

The new Walesboro plant of the Cummins Company will be one of the most advanced in the world in terms of environmental protection equipment. A 15-man task force did the initial planning for the new plant which will settle into the surrounding woodlands almost as if it were part of the landscape. Three of the five goals of the task force had to do with improved productivity, more flexibility in manufacturing, and greater capacity. The remaining two goals were that the internal and external plant environments be enhanced to the point that they exceeded the strictest state or federal standards, while every effort was to be made to provide surroundings that would attract skilled and motivated people. In planning the move a detailed machine-data survey was made.

16983 APTIC NO. 34501

A CORPORATE CONCERN FOR OUR ENVIRONMENT. *PPG Products, 79(1):10-11, 1971.*

At PPG, environmental control has emerged as a major administrative segment of corporate activity. The Environmental Control Policy Committee was established in 1969. Chaired by the vice president of corporate relations, it includes the manufacturing vice presidents of the company s four operating divisions. Company pollution control spending is projected at a minimum of $52.5 million for 1971-75. The Glass Division designed what it calls continuous air recording units to collect ambient air data in the area of its plants, while a PPG-designed noiseless and smokeless incinerator for liquid organic and aqueous wastes will solve a disposal problem at some of the company s Coatings and Resins Division facilities. An environmental control laboratory was recently established to serve all four divisions and PPG s subsidiaries.

16984 APTIC NO. 34505

Study Group on Air Pollution Sampling Network (Japan)

REPORT OF INVESTIGATION ON MONITORING EQUIPMENT (TELEMETER) FOR AIR POLLUTION AT THE LOCAL SELF-GOVERNING BODY. *(Chiho jichitai ni secchi sareta taiki osen shuchu kanshi sochi (telemeta sochi) chosa hokoku). Text in Japanese. 14p., March 1969.*

A study was done on eleven self-governing bodies and five telemeter manufacturers in order to establish the actual conditions of the type, scale, and management of air pollution monitoring equipment. Questionnaires concerning the size and management methods of monitoring equipment were answered by self-governing bodies as users with respect to the general state of telemeter systems (such as the transmission methods and administrative districts per monitoring stations); monitoring station (pollutants observed, the height of sampling hole from the ground and meteorological element, items monitored, and the number of channels); and facilities of central monitoring stations and methods of data processing. Technical questions on the input signal for telemeters and their accuracy were posed to manufacturers. The wireless and large size telemeters were used at prefectural stations; those used at city stations were wire analogue types, and the equipment for data processing was either small in size or did not exist because no station had yet been established. Some cities did not have any specialists for telemeters and data processing. A technician should be put in charge of the management. The differences between Kanto and Kansai Districts at the time of collecting data, tape punching the code, etc. may become a problem in case of nation-wide processing of data.

16985 APTIC NO. 34554

FEDERAL IMMISSION PROTECTION LAW. *(Bundesimmissionsschutzgesetz). Text in German. Sanit Heinzungstech., 36 (10):734, Oct. 1971.*

The draft of a law for protection against air pollution and noise was placed before the Bundestag by the Federal Government last August. According to the opinion of the government, a uniform federal law is required to close the gap between the fragmentary laws existing on both the federal and state levels. The law demands that everybody reduce harmful pollution to a minimum. Prerequisite to passage of the bill is an expansion of the political power of the federal government to the fields of air and noise pollution. Large polluters will be subject to a strict licensing process. But smaller enterprises will be inspected too. Furthermore, the use of machines, tools, and fuels will be allowed only if they comply with certain requirements which have been set up for the protection of the environment. A general air monitoring system and an inspection system will be erected in residential and industrial centers. All air pollution sources such as industries, automobiles, and domestic heaters will be listed. Non-compliance with protective regulations will be punished by five to ten years of imprisonment or by fines of up to $25,000.

16986 APTIC NO. 34655

SITING AIR POLLUTION SAMPLERS. NBS ASSISTS ENVIRONMENTAL PROTECTION AGENCY. *Natl. Bur. Std. U. S. Tech. News Bull., 55(11):278-279, Nov. 1971.*

Now that pollutants are being measured systematically in metropolitan areas, choosing locations for air pollution samplers becomes important. The National Bureau of Standards has demonstrated site selection procedures by using emission, population, and meteorological data for an actual Air Quality Control Region as inputs to a computer-operated diffusion model. From the calculated data, projected concentration contours can be plotted on maps for each pollutant or combination of them for specific seasons. A band can also be identified that contains pollution concentrations within a given amount of the mean value over the area of interest. These contour maps for each pollutant and season of interest are then superimposed, and sampler location points are selected where the bands overlap or intersect. The National Bureau of Standards site location procedure was applied experimentally to the Buffalo, New York, Air Quality Control Region.

16987 APTIC NO. 34685

Dept. of Environmental Quality, Portland, Ore., Air Quality Control Div.

REPORT ON OREGON S AIR QUALITY AND PROGRAM FOR YEARS 1968 AND 1969. *91p., Dec. 1969.*

The history of air pollution control in Oregon is reviewed. Recent environmental legislation is outlined, and the program of the Department of Environmental Quality is presented. During 1969, a statewide rapid survey of emissions of all major contaminants was made, using a variety of estimation techniques. Pollutants included nitrogen dioxide oxidants, nitric oxide, sulfur dioxide, and carbon monoxide. Meteorological factors were considered. The Oregon-Washington Air Quality Committee developed and published recommended standards for suspended particulate and particle fallout, and initiated development of ambient air quality standards for sulfur dioxide. Emission standards and regulations were also issued. Activities of the Department of Environmental Quality include the investigation of complaints, air quality monitoring, community surveys, special studies, and educational activities. Enforcement and control are discussed for various sources such as pulp mills, asphalt plants, rendering plants, open burning, and motor vehicles. Tax relief for pollution control facilities is discussed, as well as future program needs.

16988 APTIC NO. 34688

California State Dept. of Public Health, San Francisco, Calif., Air Pollution Study Project

CLEAN AIR FOR CALIFORNIA. (INITIAL REPORT). *60p., March 1955. 128 refs.*

Based on its initial review of the body of knowledge presently available about the growing problem of polluted air, the California State Department of Public Health recommends that a measurement and control program be developed to remedy the problem of air pollution, with its health aspects paramount. The history of air pollution in California is reviewed, with particular reference to the characteristic effects of smog in Los Angeles. Motor vehicles, oil refineries, fuel oil and gas, gasoline marketing and distribution, refuse incineration and disposal, chemical processing, and other sources of pollution are cited. Dust storms and other rural air pollution problems are also listed. Meteorological and topographical factors are considered for various areas of California. Mortality data, hospital admissions, industrial absenteeism, and mortality statistics are presented. Critical thresholds are cited. Toxic substances and their physiological effects are discussed. Zoning, substitution of materials and methods, improving ventilation, neutralizing the pollutants, and other control methods are listed. Measurement methods are also indicated.

16989 APTIC NO. 34689

California State Dept. of Public Health, Berkeley

REPORT III...A PROGRESS REPORT OF CALIFORNIA S FIGHT AGAINST AIR POLLUTION. *32p., Feb. 1957.*

Air pollution developments throughout the state of California are briefly traced -- developments in clarification of the problem, in control activities, in research on both environmental and medical aspects of the problem, and in setting guidelines for future work. Inversions which make California vulnerable to smog are mentioned, as well as increasing urbanization. The attitude of the public toward the problem is discussed. Plant damage and radioactive fallout are also mentioned. The air pollution control regions are listed. Federal government interest, legislative interest, and the interest of the medical profession are weighed. Studies which have been conducted by the State of California are outlined. They have included an asthma study, the relationship between mortality and smog, air quality measurements, and an oxidant study.

16990 APTIC NO. 34784

GUIDE FOR CONTROL OF AIR POLLUTION EPISODES. IN SMALL URGAN AREAS. *Environmental Protection Agency, Research Triangle Park, N. C., Office of Air Programs, Public Health Service Contract PH-22-68-32, Pub-AP-78, 60p., June 1971. 6 refs.*

NTIS: PB 201458

This manual is intended to assist local air pollution control officials concerned with the design and implementation of emergency action plans for the avoidance of air pollution episodes. The manual is directed toward the needs of relatively small cities. Occurrence of air pollution episodes is reviewed, and definitions of episode factors are presented. The effects of particulates, sulfur oxides, carbon monoxide, oxidants, and oxides of nitrogen are indicated. Meteorological factors related to air pollution episodes are listed, as well as atmospheric indicators of episode development. Mixing height, lapse rate, and stability are mentioned. The formulation and implementation of an emergency action plan are discussed. Communications and emission source inventories are cited. Air quality observations and atmospheric dispersion estimation are indicated. Socio-economic factors are considered. A glossary of air pollution terms is included, and air quality criteria are tabulated.

16991 APTIC NO. 34796

GUIDELINES: AIR QUALITY SURVEILLANCE NETWORKS. *Air Pollution Control Office, Raleigh, N. C., Office of Air Programs, Pub.-AP-98, 14p., 1970?*

NTIS: PB 200728

Guidelines are presented to assist state and local agencies in setting up air quality surveillance programs. The development of an air quality surveillance program includes determining the number and location of sampling sites, selecting appropriate instrumentation, and establishing a data information system. Objectives of regional surveillance and network design are discussed. Particulates should be measured, as well as carbon monoxide, sulfur dioxide, nitric oxide, nitrogen dioxide, nonmethane and total hydrocarbons, and oxidants.

16992 APTIC NO. 34926

Coordinating Research Council, Inc., New York, Air Pollution Research Advisory Committee

APRAC STATUS REPORT. *109p., Jan. 1971.*

The Coordinating Research Council s research program on automotive air pollution is being accomplished with support from the automotive industry, the petroleum industry, and the Government. Summaries are presented of engineering projects which explore the interactions between petroleum products and the automotive equipment in which the products are used, atmospheric projects aimed at explaining pollutant behavior in the atmosphere, and medical projects to determine the effect of emissions upon health. Exhaust odor, combustion processes within engine exhaust systems, automotive fueling emissions, driving patterns, instrumentation for nitrogen oxides and oxygenates in exhaust gas, methods for analysis of particulates and polynuclear aromatics, inspection, maintenance, surveillance, and economic effectiveness, and characterization of particulates versus fuel composition are some of the engineering projects outlined. Atmospheric projects include chamber reactivity, plant damage, a diffusion model of the urban atmosphere, the fate of carbon monoxide, light hydrocarbons in the atmosphere, haze formation, and atmospheric pollutants in the urban air. Medical projects have included the exposure to carbon monoxide, nitrogen oxides, oxidants, and polynuclear aromatic hydrocarbons, and synergistic effects.

16993 APTIC NO. 34980

Study Group on Pollution and Inhabitants

ENVIRONMENTAL POLLUTION AND INHABITANTS MOVEMENT AT ANNAKA CITY. *(Annakashi ni okeru kogai to jumin undo). Text in Japanese. 52p., 1971 (?). 16 refs.*

The source of pollution that has caused environmental hazards at Annaka City, Gumma Prefecture is only a metal refining plant. Since the move to pollution was deeply affected by the characteristics of the community, geographical and historical conditions, industrial structure, and damages to soil, crops, plants, and humans were investigated. Countermeasures of the Ministry of Health and Welfare, the Ministry of Trade and Industry, Gumma Prefecture, and Annaka Municipality were discussed. Pollution at Annaka City has been caused by cadmium, zinc, and lead. The Ministry of Health and Welfare made a study from the viewpoint of environmental pollution, health of inhabitants, and source of pollution. Since the illegal act of the Inspectorate Division of the Tokyo Mining District against the mining safety law in regard to an Annaka refining plant, the Ministry of Trade and Industry has been studying the methods of pollution control. Gumma Prefecture and Annaka Municipality have also made continuous investigations on pollution since Ministry of Health and Welfare assigned the city as an investigation-required region in 1969. Twenty-five organizations of inhabitants against environmental pollution and their supporting groups are mentioned. The philosophy of the two major groups are different and antagonistic. One was organized by victims of the region and is against industry. This group is called the Antagonists group. The other is formed by area residents and conservative members of the municipal assembly and is called the Cooperative group. The history of development, organization, the results of activity, and the supporting bodies of both groups were briefly discussed.

16994 APTIC NO. 34991

OPEN BURNING REGULATIONS FOR FLORIDA AGRICULTURE. ADHERENCE WILL NOT UNDULY HAMPER NORMAL LANDOWNER OPERATIONS. *Fla. Grow. Rancher, 64(10):8-9, Oct. 1971.*

The Florida Department of Pollution Control has established specific rules relating to open burning and frost protection fires. Burning routinely will be allowed between 9:00 a.m. and one hour before sunset daily. The weather will be the controlling factor. A meteorologist, assigned by the U.S. Weather Service to provide continuing weather data for the Division of Forestry, will provide the guidelines which will be in the form of an air stagnation index. A high stagnation index would indicate that burning at night could create a pollution problem. During periods of extreme drought, when the danger of forest fires is high, burning will not be allowed. The Division of Forestry must also be notified and consulted before any land clearing burning operations are undertaken.

16995 APTIC NO. 35003

CONTROLLING AIR POLLUTION. *Chem. Process. (London), 17(8):29, 31, Aug. 1971. 1 ref.*

When the question of controlling air pollution arises, one requires information on what to control, to what extent and, of course, how to control it. It is not yet possible to make a precise quantitative measurement of health and welfare effects of air pollution and, until such measurement is possible, action must be based upon the limited knowledge that is already available. The World Health Organization Inter-regional Symposium on Criteria for Air Quality and Methods of Measurement, held in Geneva in 1963, defined four categories of air quality in terms of limiting values which may vary for a given contaminant. The WHO expert committee also suggested the setting up of international guides but the Prague Symposium in 1967 considered this suggestion and concluded that, although the publication of international guides of air quality could be useful in enabling countries to assess the air pollution problems with which they were confronted, practical steps to control air pollution problems should not await such publication. Air pollution legislation in Great Britain is cited, with particular reference to The Alkali Act.

16996 APTIC NO. 34651

Adelman, Martin H.

NEW FEDERAL REGULATIONS AIMED AT SIX POLLUTANTS. *Metal Progr., 100(6):54-55, Dec. 1971.*

The basic federal law dealing with air pollution is the Clean Air Act, parts of which were enacted as early as 1963. The amendments of 1970 contain a general authorization for the Environmental Protection Agency to conduct, assist, or support research relating to the causes, effects, extent, prevention, and control of air pollution. This law establishes motor vehicle emission and fuel standards with compliance testing and certification. It sets forth standards of performance for new stationary sources and national emission standards for hazardous pollutants. It provides for federal enforcement, inspections, and monitoring. Other items include the establishment of Air Quality Control Regions, Air Quality Criteria, and National Ambient Air Quality Standards. Detection and measurement methods are mentioned, including a surveillance network. Major pollutants and their sources are indicated.

16997 APTIC NO. 34844

Barth, D. C.

STRATEGY FOR ENVIRONMENTAL RESEARCH IN THE 70 S. *Preprint, Missouri Univ., Columiba, 14p., 1971. (Presented at the Conference on Trace Substances in Environmental Health, Annual, 5th, Columbia, Mo., June 29, 1971.)*

Environmental research under sponsorship of the Environmental Protection Agency will proceed from studies of a single pollutant and its effects to studies and actions based on multimedia, multipollutant, total effect considerations that involve unified and systematic approaches to environmental problems. The overall EPA effort includes waste-treatment technology; research on the pathways and effects of environmental stressors; research on the interactions between environmental factors and social, economic, and health matters; basic studies on environmental base-lines; monitoring technology, operations, and data treatment; and research on ways in which to integrate the results of research, development, and monitoring activities. This large-scale research will require a multidisciplinary approach and the use of computers and methods of systems and operational analysis. Examples of research needs are given for the specific case of trace substances.

16998 APTIC NO. 34656

Bellomo, Salvatore J. and Edward Edgerley, Jr.

WAYS TO REDUCE AIR POLLUTION THROUGH PLANNING DESIGN AND OPERATIONS. *Highway Res. Rec., no. 356:139-157, 1971. 18 refs. (Presented at the Committee on Social, Economic and Environmental Factors of Transportation, Annual Meeting, 50th.)*

A compendium of case examples is presented that illustrate how air pollution emissions and concentrations can be reduced through proper planning, design, and operation of transportation systems and urban development. These reductions are in addition to those obtained by legislative air pollution controls on vehicles and stationary source emissions. Carbon monoxide, sulfur oxides, particulates, hydrocarbons, and nitrogen oxides are mentioned. The case studies examined vary from the simulation of work travel and air pollution for a hypothetical city of two and a half million people to individual analyses of air pollution reductions in Twin Cities, Seattle, Montgomery and Prince George s Counties (Maryland), Great Britain and other areas. The spatial arrangement of economic activities, the development of dense corridors to increase transit usage, the diversion of more travel to freely operating freeways, and the reduction of trip length have positive effects on reducing air pollution levels. Concentrations resulting from vehicular pollution can be minimized if the highway is segregated from adjoining structures either by distance or by open space barriers. When these separations are not possible, ventilation will be required to meet acceptable air quality standards. Improvement of traffic flow, the use of transport pricing policies, and the use of smaller cars with smaller engines can reduce the pollution levels for carbon monoxide and hydrocarbons significantly. (Author abstract modified)

16999 APTIC NO. 34780

Berge, Helmut

HARMFUL EMISSIONS IN TOWNS AND THEIR ENVIRONMENTS. *(Schaedliche Immissionen in der Stadt und ihrer Umgebung). Text in German. Vitalst. Zivilisationskr., no. 4:161-163, 1969. 10 refs.*

Standards for harmful emissions do not relieve officials in individual towns of the duty to study conditions typical of the towns and their outskirts. Measures taken by town and country planners to decrease harmful emissions depend on the extent and grouping of parks. As determined by a study of dust precipitation, the way in which parks are utilized is decisive. Soil-covering wood between roadways and footpaths gives better protection against dust than a lawn of the same width. Special attention must be given to bitumen pavements and their possible harmful effects. National levels of gas, smoke, and dust would be useful if not used to draw conclusions as to existing or potential harm. (Author abstract modified)

17000 APTIC NO. 34331

Bibbero, Robert J.

SYSTEMS APPROACH TOWARD NATIONWIDE AIR-POLLUTION CONTROL. II. THE TECHNICAL REQUIREMENTS. *IEEE (Inst. Elec. Electron. Engrs.) Spectrum, 8(11):73-81, Nov. 1971. 25 refs.*

In operating an air pollution control system, subsystem monitoring of current pollution levels must conform to temporal and spatial factors, which are established by the dose-effect criteria of pollution damage on the one hand, and by the requirements for area coverage and minimum measurement reliability levels on the other. The prediction subsystem, drawing on the same data supplemented by meteorological inputs, will be required to furnish both long-term future estimates and detailed short-term forecasts, but not necessarily with the same equipment. Forecasting will utilize up-to-date information on source emissions, applied to detailed mathematical models of the chemical and physical behavior of polluted air and the micrometeorology of cities. The business end of pollution control consists of the codes and social organization that, in the long term, permit pollution-emitting sources to operate in the first place and police them after they are established. Emergency controls that are imposed during dangerous episodes are superimposed on these regulations. Current level monitoring, point and long-path sensors, data processing, trend prediction, source factors, and meteorological data are discussed.

17001 APTIC NO. 34476

Byrd, J. F.

ENGINEER S ROLE IN A CORPORATE AIR POLLUTION CONTROL PROGRAM. *Preprint, American Society of Mechanical Engineers, New York, 7p., 1971. (Presented at the American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D. C., Nov. 28-Dec. 2, 1971, Paper 71-WA/Pwr-6.)*

In a relatively large firm, with various plants and mills at several different localities, there is no substitute for having -- either full-time or part-time at the plants and the mills themselves -- an air pollution control engineer whose intimate knowledge of the processes and equipment, as well as the local political climate, is indispensable to a successful air pollution control program. On the other hand, an air pollution control staff engineer at headquarters, too, is indispensable because his broad knowledge of the many processes, laws, rules, and regulations, and all the technology involved must be available as a strong backup to the plants and mills themselves. The staff air pollution control engineer should be in a position to educate, indoctrinate, and consistently remind his colleagues at the local plants and mills of the need for continued pollution control. It is the job of the staff air pollution control engineer to see that his company is a good corporate citizen and socially responsive institution. (Author abstract modified)

17002 APTIC NO. 34869

Chaney, James H.

IMPLEMENTATION OF AN AIR QUALITY CONTROL REGION IN A TRI-STATE AREA. *Vanderbilt Univ., Nashville, Tenn., Dept. of Environmental and Water Resources Engineering, and Tennessee Stream Pollution Control Board, Environ. Water Resources Eng. Conf., 9th, Annu., Nashville, Tenn., 1970, p. 29-40. (June 4-5.)*

The Memphis area air quality control region is located in the southwestern tip of Tennessee, northwest Mississippi, and east-central Arkansas. Particulate materials are the pollutants of primary concern in this area. The Memphis region was formally designated on April 29, 1970. Air quality standards are not yet established. Although the Memphis area is a control region, Arkansas and Mississippi will oversee their respective control efforts, and the Memphis-Shelby County Health Department will administer its jurisdiction. Continuous air monitoring units be placed in DeSoto County, Miss., Crittenden County, Ark., and Shelby County, Tenn., and the results telemetered to the central point in Memphis. The data would then be disseminated by the County Health Department to the state control agencies. Sulfur oxides, particulates, carbon monoxide hydrocarbons, and nitrogen oxides emissions data are included.

17003 APTIC NO. 34661

Chleboski, Ronald

RADIO NETWORK NABS AIR-POLLUTION VIOLATORS. *Am. City, 86(12):89-90, Dec. 1971.*

A new two-way radio network helps Allegheny County Bureau of Air Pollution Control enforce one of the nation s more stringent air pollution control ordinances. The network comprises a 250-watt base station, a small console, remote control equipment including two Deskons, 12 mobile radios, and three one-way radio receivers. The new radio network should eliminate most of the waste-time problems and backtrack miles caused by ineffective communications. Three fully-automatic telemetered stations continuously monitor Allegheny County s atmosphere and feed information into a computer. Allegheny County includes Pittsburgh, Pennsylvania.

17004 APTIC NO. 35022

Detrie, J. P.

STUDIES AND RESEARCH ON THE MEASUREMENT OF POLLUTANTS, ON THEIR EFFECTS, AND PREVENTION. TERRITORIAL MANAGEMENT PROBLEMS. *(Les etudes et recherches sur la mesure des nuisances, leurs effets et la prevention. Problemes d amenagement du territorie). Text in French. Pollut. Atmos. (Paris), vol. 13:52-56, Oct. 1971.*

Research bearing on the measurement of pollutants by various societies are discussed. The Commission of European Communities has initiated research on biological or microbiological plant indicators, and on the effect of pollutants on cellular tissue cultures with the view of arriving at new air quality criteria that would be more closely related to public health than the present ones. Standardization of instruments for the measurement of ambient air quality has been achieved including apparatus for the measurement of particulate emissions, opacity, sulfur dioxide, and black smoke. Still waiting to be developed is an instrument for the measurement of nitrogen oxide emissions. Contrary to general belief, urbanization has, through the heat it generates and by reducing wind velocity through construction, actually reduced the number of foggy days by 50% in the Paris region and increased the number of sunny days by 25% as a result of increased dispersion of pollutants. Experiments in dispersion of pollutants are being conducted. Desulfurization of fuels is pursued by a number of agencies and by the oil industry. Currently crude oil with a four percent sulfur content is being desulfurized to one percent by the U.P.O. Isomax process in three refineries. In Paris, the carbon dioxide content in ambient air has increased from 320 ppm in 1900 to 357 ppm in 1970.

17005 APTIC NO. 34864

Fish, Frederic L., J. Kirby Holcombe, William A. Cote, William L. Clink, Lawrence D. Kornreich, and Peter W. Kalika

TRENDS IN POLLUTION CONTROL LAWS AND REGULATIONS. *American Inst. of Plant Engineers, New England Region, Proc. New England Eng. Maintenance Conf., Annu., 2nd, Newton, Mass., 1970, p. 1-36. (May 20-21.)*

Environmental pollution from the viewpoint of the governmental control agencies was discussed. Existing and future legislation and control policies were outlined. The Air Quality Act of 1963 provides authority to abate air pollution in interstate and intrastate areas by the Dept. of Health, Education, and Welfare. The states are responsible for carrying out recommendations. Air quality control regions are also specified. State regulations prohibit open burning and restrict the opacity of smoke emissions from stacks. These will be followed by ambient air quality standards, and fuel sulfur content restictions. Identification of pollution problems was also discussed. Trends in instrumentation are away from many older techniques using intermittent sampling or quick sniff grab samples. Even the continuous analyzer using chemical techniques are being nudged out by more advanced analyzers using physical measurement techniques. In keeping the pollution control programs abreast of trends, the plant engineer must be concerned with the identification of pollution problems, instrumentation and apparatus for the measurement of pollution, the chemical basis for action, and an engineering approach to pollution control.

17006 APTIC NO. 34486

Greco, Michael S.

THE CLEAN AIR AMENDMENTS OF 1970: BETTER AUTOMOTIVE IDEAS FROM CONGRESS. *Environ. Affairs, 1(2):384-468, June 1971. 383 refs.*

The Clean Air Amendments of 1970 are reviewed with respect to background, underlying philosophies, provisions affecting stationary pollution sources and motor vehicle pollution, and the constitutionality of the automobile pollution emission standards. Previous federal air pollution legislation included the authorization of the Public Health Service and passing of the Clean Air Act and Air Quality Act. The provisions affecting stationary sources of air pollution deal with research programs, criteria, standards, and enforcement procedures. Regulations governing motor vehicle emissions included the establishment of emission standards for carbon monoxide, photochemical oxidants, and nitrogen dioxide, fuel regulations, alternatives to the internal combustion engine, enforcement powers, penalties, and appeals.

17007 APTIC NO. 34445

Grennard, Alf

POLITICAL CONSIDERATIONS IN SULFUR DIOXIDE EMISSION CONTROL. *(Politisk svaveldioxid). Text in Swedish. Tek. Tidskr., (101)13:14-20, Sept. 2, 1971. 8 refs.*

Swedish Environmental Protection Programs are criticized. The costs involved in environmental protection measurs are borne by the consumers, thus making products less competitive on international markets. The Swedish institutions responsible for environmental protection, which possess no engineering or economic experience, set maximum requirements concerning the control of air pollution, thus causing unnecessarily large expenses to industry. The situation in the United States and Sweden are compared. Politicians and scientists with no competency in matters concerning environmental protection set unnecessarily high standards. Norms for sulfur dioxide emissions are oven more exacting in Sweden than in the U. S., although the situation in Sweden is better than in the U. S. Such regulations and decisions are sometimes motivated by private interests and political motives. The State Bureau for Nature Conservation required the use of fuels with lower sulfur content, yet sulfur dioxide represents only one of the many sources of air pollution, and, due to the synergetic effects of many other pollutants, the specific damages caused by sulfur dioxide cannot be isolated properly. Sulfur dioxide cannot be regarded as the chief source of air pollution. The use of fuels with lower sulfur content can cause great expense to Swedish industry. Such high requirements are unfounded, due to the lack of reliable experimental data.

17008 APTIC NO. 34372

Hallgren, Richard E.

GLOBAL MONITORING – SOMETHING OLD AND NEW. *Bull. Am. Meteorol. Soc., 52(7):539-543, July 1971. (Presented at the American Meteorological Society, Annual Meeting, 51st, San Francisco, Calif., Jan. 1971.)*

Global research programs in parallel with global monitoring are needed to solve problems associated with climatic effects of carbon dioxide and particulates in air; air pollution by aircraft;

contamination of both air and oceans by pesticides and metals; and marine pollution by oil and detergents. The planning and implementation of several international monitoring programs are outlined. Four or five geostationary satellites for global coverage will be available for the World Weather Watch and the Global Atmospheric Research Program. The satellites will provide much of the wind data needed in extratropical regions, while advanced spectrophotometers will provide temperature and possibly moisture observations in cloudy regions. In the tropics, heavy emphasis will be placed in installation of conventional sounding systems. A proposed network of regional and baseline monitoring stations will measure turbidity, carbon dioxide, components of precipitation and fallout, and changes in atmospheric composition due to changes in regional land use patterns. The International Atomic Agency, together with United Nations Agencies, is already monitoring radioactivity in precipitation and major rivers. Ocean monitoring is in a very early stage of development, but 20 nations plan to participate in the Integrated Global Ocean Station System, a program for monitoring or observing chemical, physical, and biological aspects of the ocean. An intergovernmental body is proposed to coordinate and evaluate all global monitoring programs.

17009 APTIC NO. 34802

Hartogensis, F.

REVIEW OF THE LEGISLATION OF A FEW WEST-EUROPEAN COUNTRIES IN THE MATTER OF SULPHUR DIOXIDE LIMITATION IN THE ATMOSPHERE. *(Overzicht van de wetgeving in enkele Westeuropese landen ter beperking van zwaveldioxide in de atmosfeer). Text in Dutch. Ingenieursblad, 40(11-12):341-345, 1971.*

Legislation limiting sulfur dioxide is reviewed for Belgium, Netherlands, Italy, France, Switzerland, West Germany, and England. The agencies in charge of controlling pollution are included. Special legal actions taken to reduce SO2 pollution are reviewed. In Germany, the sulfur content of oils, for areas around Nordrhein-Westfalen is limited to 1.8% sulfur. In Sweden, for all fuels, the sulfur content is 2.5%. A table containing permissible sulfur contents for all fractions of fuel oils, as used in West Germany is included. Boundary values of SO2 concentrations for different countries are included. For example, the 30 min maximum value for Germany is 400 micrograms SO2/cu m; for Switzerland, 810 micrograms SO2/cu m in summer and 1350 micrograms SO2/cu m in winter. The 24 hr maximum values for Netherlands is 150 micrograms SO2/cu m (median); for France, 750 micrograms SO2/cu m; for Switzerland, 540 micrograms SO2/cu m; in summer and 810 micrograms SO2/cu m in winter. The differences in these values and their interpretations are explained. The recent changes in the philosophy and in the laws are discussed.

17010 APTIC NO. 34565

Henz, Donald J.

EMISSION REGULATIONS FOR FUEL-BURNING INSTALLATIONS -- EFFECT OF THE CLEAN AIR ACT. *Preprint, American Society of Mechanical Engineers, New York, 7p., 1971. (Presented at the American Society of Machanical Engineers, Winter Annual Meeting, Washington, D. C., Nov. 28 - Dec. 2, 1971, Paper 71-WA/APC-2.)*

The basic authority for adoption and enforcement of state and local air pollution control regulations is discussed together with the generic types of currently enforced emission regulations for fuel combustion and the specific particulate matter, sulfur oxides, and nitrogen oxides emission standards likely to be adopted for fuel-burning installations. Difficulties in drafting regulatory language are pointed out along with certain disadvantages of exemplary regulations proposed by the Environmental Protection Agency. Recommendations are presented to help the engineer participate effectively in the development of objective regulations on the state or local level.

17011 APTIC NO. 34977

Kawanishi, Saburo

AN ORDINANCE OF KANAGAWA PREFECTURAL GOVERNMENT SHOWED NEW THOUGHT OF ENVIRONMENTAL PROBLEM. *(Atarashii kogai taisaku no hoko o shimeshita Kanagawa ken kogai boshi jorei). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 7(11):76-82, Nov. 1971.*

As a result of revision of the Air Pollution Act, in Dec. 1970 Kanagawa Prefecture issued a list of machinery and operations which are potential emission sources. Those who are engaging in such operation or machinery and those who are planning to engage them in the future, must submit an application for permission from the governor, or from mayors in cases of Yokohama and Kawasaki cities. If any changes are to be made after permission has been granted, another permission must be requested before effecting changes. According to this ordinance, the control of stack gases is directed toward the abatement of pollution at its emission sources, rather than the previous program for high stack dispersion method. Absolute emission standards for sulfur oxides and dusts were determined for a plant and a place of operation as a whole. The sulfur oxides emission standard is: reduction rate index multiplied by (heavy oil consumption/hour, obtained from the total quantity of oil consumption for one year prior to the enactment of the ordinance, divided by 55.2 plus sulfur oxide emitted per hour by combustion or processing of materials other than heavy oil). The emission standard for dusts for one boiler (g/h) is: reduction rate index multiplied by 2.56 Wn. WWn is the amount of heavy oil consumption per hour per boiler. As to toxic materials, one half to one tenth of the national emission standards were enforced by Kanagawa prefecture. The maximum permissible concentration for the stack gas from boats larger than 3000 tons in Yokohama and Kawasaki harbors is one by the Ringelmann chart. Hoods and dust collectors are required for plants using coke furnaces, and spray anti-dust covers are required for depositories of minerals, pebbles and sands, landfill locations, and quarries.

17012 APTIC NO. 35038

Laszlo, Aujeszky

THE FIRST GREAT RESULT IN THE FIGHT AGAINST AIR POLLUTION *(A levegoszennyezes ellen valo kuzdelem elso nagyobb eredmenyei). Text in Hungarian. Energia Atomtech. (Budapest), 24(4):158, April 1971.*

During the first half of the 20th century, climatic, industrial, and domestic heating conditions in London made smog and complete darkness during the noon hours a common winter occurrence. London was the first European city to institute an effective air pollution control program. Protected areas were designated in the city where only smokeless fuels or electricity were permitted to heat the buildings. Industrial stacks had to be smokeless; violators faced heavy fines. Now smog has been curtailed. During the last smog, in 1962, 4450 mg of sulfur dioxide was found in one cu m of London air; in 1969 the maximum SO2 concentration was 820 mg/cu m. Particulates decreased during the same period (from 2890 mg/cu m to 420 mg/cu m). There has been no smog in London for the last nine years. Even better results are expected for control programs on the Eastern shore of the Danube and in Budapest.

17013 APTIC NO. 34755

Partee, Frank P.

AIR POLLUTION CONTROL IN KENTUCKY - THE SURPRISE STATE. *Vanderbilt Univ., Nashville, Tenn. Dept of Environmental and Water Resources Engineering, and Tennessee Stream Pollution Control Board, Environ. Water Resources Eng. Conf., 9th, Annu., Nashville, Tenn., 1970, p. 1-19, 6 refs. (June 4-5.)*

Population statistics and the topography and meteorology of Kentucky are reviewed. Sources of air pollution include motor vehicles, jet aircraft, open burning, and a wide variety of industrial process emissions, including steel mills, foundries, aluminum refineries, chemical plants, petroleum refineries, charcoal and coke plants, asphalt plants, cement plants, paper mills, and extensive mineral production. Unique odor problems occur from the numerous tobacco curing sheds and warehouses. The Air Pollution Control Commission, established in 1966 under the Kentucky Air Pollution Control Law, consists of 13 members including heads of the Departments of Health, Commerce, Natural Resources, and Agriculture, and the Attorney General. Of the eight appointed members three represent industry; three, the general public; and one each, the University of Kentucky and a local control agency. The Technical Services section is responsible for data processing and air monitoring. Field Enforcement Services obtains compliance with regulations, and Engineering Services oversees source registration, emission inventories, development of emission standards, and consultative services. Intergovernmental operations are discussed. Future developments in the Kentucky air pollution control program may include additional emission standards for sulfur oxides and solvent vapor emissions. Motor vehicle air pollution control device inspection will be tied to proposed state safety inspection programs.

17014 APTIC NO. 34804

Robinson, G. D.

LONG-TERM EFFECTS OF AIR POLLUTION. A FIVE-YEAR RESEARCH PROGRAM. *Center for the Environment and Man, Inc., Hartford, Conn., Air Pollution Control Office Contract CPA-22-69-155, CEM 4029-438, 32p., May 1971.*

NTIS: PB 200517

The major problem areas of air pollution were identified. Priorities were allocated to the problem areas; these priorities refer only to the long-term aspects of the problem. Criteria for the allocation of the priorities were discussed. Allocation of available funds was suggested. Research projects are identified more or less self-contained areas of research related to the problems and unified by content or technique. The criteria for allocation of priority of funding are the magnitude of the threat to existing standards of life and existing populations, the relevance to public policy, the degree of public concern, the magnitude of the required funding relative to that available, and the likelihood of a fairly rapid return for money expended. Some of the more important recommended projects were described. Projects include those connected with acid precipitation; the particle content of the lower stratosphere; long-term climatic change; fog, clouds, and precipitation; visibility; solar radiation; temperature; tracer studies; monitoring; carbon dioxide; transport; and plume studies.

17015 APTIC NO. 34516

Ross, F. Fraser

SULPHUR IN THE AIR. *Surveyor-Local Govt. Technol., 127(4108):32- 33, March 1971.*

The maximum sulfur limit for all fuel oil proposed by the city of London will increase fuel costs and result in really large users competing for limited supplies of desulfurized fuel. The first and most important modification of such a policy is to exempt from restrictions all installations meeting recommendations for chimney height. The second desirable modification is to limit the restriction to periods when the weather is adverse with respect to ground-level pollution from low-level releases. Consumers who cannot comply with chimney height recommendations could be given the further option of storing a three-day supply of low-sulfur fuel and of using it on notification of a sulfur alert.

17016 APTIC NO. 34578

Ruckelshaus, William D.

ENVIRONMENTAL PROTECTION AGENCY. (18 CFR PART 602). CERTIFICATION OF FACILITIES. NOTICE OF PROPOSED RULE MAKING. *Federal Register, 35(251):19686-19688, Dec. 29, 1970.*

General policies and requirements have been revised pertaining to certification of air and water pollution control facilities for tax deduction purposes. Applications for certification are indicated.

17017 APTIC NO. 34600

Stans, Maurice H.

QUICK POLLUTION SOLUTIONS MAY BE SELF-DEFEATING. *Solid Wastes Manage./Refuse Removal J., 14(10):20, 54, 56, 61-62, Oct. 1971.*

The major environmental pollution problems are too complex to be resolved instantly. They call for careful consideration of priorities and financing and long-range programs to deal with them on a balanced basis of regular, gradual improvements. Business alone cannot be held responsible for all pollution. The burdens of responsibility and cost must be shared by all levels of government, by agriculture, and by the public. The technology needed to solve environmental problems must still be developed in many fields. Attempts to solve the problems more quickly than technology permits not only raises cost sharply but can create massive new problems, such as laws banning phosphate detergents, DDT, and construction of new power plants. Finally, there must be greater conformity of state and local control regulations.

17018 APTIC NO. 34357

Vanyo, James P.

LAW, OPERATIONS RESEARCH, AND THE ENVIORNMENT. *J. Environ. Syst., 1(3):213-236, Sept. 1971. 27 refs.*

An initial attempt was made to formulate a general legal-technical systems solution to environmental problems. A review of the scope and nature of the legal process includes substantive law, procedural law, the origin of rules and laws, and the daily exigencies of law practice. The application of operations research and systems analysis to environmental law is then considered. Network analysis, game theory, and simulation are considered.

17019 APTIC NO. 34450

Wilting, J. J.

AIR POLLUTION MEASURING NETWORKS. *(Meetnetten voor luchtverontreiniging). Text in Dutch. Ingenieur, 82(27):75-82, July 3, 1970. 8 refs.*

In close cooperation with the National Institute of Public Health at Bilthoven, the design and development of a countrywide air pollution monitoring network was contracted between the Netherlands government and the Philips Company at Eindhoven. Different approaches are discussed; it is made clear, that an automatic on-line system with regional networks and regional data-processors may lead to an economical and versatile solution. A brief description is given of the automatic air pollution measuring network, recently installed as a separate project in the Rijnmond area. In this network, thirty-one sulfur dioxide monitors are continuously monitoring the air pollution; they are connected on-line to a small computer. (Author summary modified)

17020 APTIC NO. 34342

Zuendorf, Otto Josef

DOCUMENTATION OF AIR POLLUTION: EMISSION CADASTRE. *(Dokumentation der Luftverschmutzung: Emissionskataster). Text in German. Umschau (Frankfurt), 71(23):850, 1971.*

With the aid of data processing the documentation of all pollutants emitted into the atmosphere is feasible. In an area of about 500 sq km, all air pollutants emitted by industries, domestic heater, and traffic are measured. In industries, the emissions from stacks or outlets and even leakage are measured individually. With traffic and domestic heaters, only the local distribution parameters are determined individually. For the rest, statistically determined information is used. With the aid of various computer programs, the total emission and the fraction of individual components can be determined. Distribution calculations for larger areas are feasible for 36 wind directions, 10 wind velocities and six distribution classes. For the 500 sq km area which includes Cologne and its immediate environment, data collection will be completed by 1972.

SOCIAL ASPECTS

17021 APTIC NO. 35020

Perdon, Henri

INFORMATION, DOCUMENTATION, AND INSTRUCTION CONCERNING THE PREVENTION OF ATMOSPHERIC POLLUTION. *(Information, documentation, formation pour la prevention de la pollution atmospherique). Text in French. Pollut. Atmos. (Paris), vol 13:57-59, Oct. 1971.*

The Association for the Prevention of Atmospheric Pollution educates the public through lectures, exhibits, congresses, Clean Air Weeks, and other related activities. Other organizations are engaged in the dissemination of specialized information are mentioned. Several hundred heating engineers, are trained in schools at Lille, Lyon, Marseille, Mulhouse, and Rouen. Other schools provide training for hygiene engineers and inspectors of heating installations. The decision by the Secretary of the Ministry for the Protection of Nature and of the Environment to train generalists should broaden the rather specialized training courses.

17022 APTIC NO. 34741

Schoonover, Barbara L. and David J. Sherriff

PUBLIC RELATIONS, LAW, ENVIRONMENTAL POLLUTION. *Cleveland State Law Rev., 18(3):467-472, Sept. 1969. 8 refs.*

Public relations often can support the law by creating an atmosphere in which the law can more effectively perform its function of protecting the people and preserving the health of society. There are laws in effect to curb air and water pollution, but a substantial number of industries do not comply. There are five major reasons for lack of enforcement. (1) The laws, particularly at the local level, are often poorly constructed. (2) There is a shortage of personnel qualified to determine violations. (3) There is a shortage both of equipment and funds for enforcement. (4) Pollution problems cut across political boundaries. (5) There is a lack of general public interest. If the public demands action on pollution, the government will respond. In the last year or so, public relations and advertising have come into wider use in anti-pollution efforts. In Cleveland, the capabilities of public relations were used to secure public effort and involvement in a specific antipollution effort. The campaign resulted in passage of a $100 million water pollution bond issue. Public relations activity to change laws should be undertaken on a national scale. At the same time, in each of the 60 regions of major pollution, local saturation publicity campaigns should be conducted.

17023 APTIC NO. 34695

Starr, C.

BENEFIT-COST RELATIONSHIPS IN SOCIO-TECHNICAL SYSTEMS. *International Atomic Energy Agency, Vienna (Austria) and Atomic Energy Commission, Washington, D. C., Symp. Environ. Aspects Nucl. Power Stations, New York, 1970, p. 895-917. 3 refs. (Aug. 10-14, Paper 146/47.)*

As the number of our socio-technical systems increase and their impact on the individual becomes more apparent, concern with balancing the utility of these systems against their societal costs has also increased. An approach is presented for establishing a quantitative measure of such trade-offs, with public safety as a specific example. The analysis is based on two assumptions: the first is that historical records are adequate for revealing consistent attitudes on safety in the public use of technology; the second assumption is that such historical social attitudes are sufficiently enduring to permit their use for predictive purposes. Societal activities fall into two general categories; those in which the individual participates on a voluntary basis and those in which the participation is involuntary because it is imposed by the society in which the individual lives. Indications from this study are that the public is willing to accept voluntary risks roughly 1000 times greater than involuntary risks. The acceptability of risk appears to be an exponential function of the benefits, real or imagined. In a sample application of these findings and several others to atomic power plant safety, it appears that economic criteria would result in a design-target risk very much lower than the present socially accepted risk for electric power plants. (Author abstract modified)

17024 APTIC NO. 34882

Wohlers, H. C., E. Katz, L. Malfara, and J. Plater-Zyberk

AIR POLLUTION AS A FUNCTION OF POPULATION. *Inst. of Environmental Sciences, Mt. Prospect, Ill., Inst. Environ. Sci., Tech. Meet., Proc., 15th, Anaheim, Calif., 1969, p. 158-163. 20 refs. (April 20-24.)*

Air pollution as a function of population was discussed. Population was related to emissions of air pollutants, air concentrations, pollution costs and air pollution effects including corrosion, visibility, fabric soiling and deterioration, and health effects. One objective of the study was to determine an optimum city size from an air pollution point of view. A study of the results indicated an increase of pollution emissions, concentrations, effects, and costs to the maximum urban area of seven million people. With the forecast increase in people and products to the year 2000, it becomes imperative to initiate air pollution control as soon as possible. A standard metropolitan statistical area of three million could save $225 million yearly for annual pollution controls costs of $45 million. There was a steep rate of increase of several air pollution effects at the low population levels. From such results, it was postulated that an optimum size of an urban area would be one-quarter of a million people. Further, to allow for pollution decay before the air mass of one city passed over another city, a space separation of at least 20 miles between urban areas was suggested. Ideally, the air between cities should be a mixture of farming and forested areas for recreational purposes.

GENERAL

17025 APTIC NO. 34610

Doerling, E.

BIOENGINEERS FOR ENVIRONMENTAL PROTECTION. FACULTY SINCE 1970 AT THE UNIVERSITY FOR PROCESS ENGINEERING HAMBURG-BERGEDORF. *(Bioingenieure fuer Umweltschutz. Studium seit 1970 an Fachhochschule fuer Verfahrenstechnik Hamburg-Bergedorf). Text in German. VDI (Ver. Deut. Ingr.) Nachr. (Berlin), 25(42):10, Oct. 1971.*

The natural partnership between man and environment is in danger. Industrialization and motorization have polluted the air so that with unfavorable weather conditions, respiratory difficulties may occur. By private means, a new discipline has been created at a private university for process engineering in Hamburg-Bergedorf. Bioengineers are being trained over a period of six terms. The curriculum comprises the fundamentals of engineering science and all problems connected with environmental pollution and protection. The medical, biological, biochemical, biophysical, and biomedical aspects of environmental protection are taught. It is the first university to have created such discipline.

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THIS FORM IS TO BE USED FOR ORDERING MICROFICHE DUPLICATES. INDICATE THE ARTICLES YOU REQUIRE BY CIRCLING THEIR APTIC NUMBERS. IF YOU DO NOT HAVE ACCESS TO A MICROFICHE READER, YOU MAY REQUEST PAPER COPIES. HOWEVER, MICROFICHE CAN USUALLY BE PROVIDED IN ABOUT 1/5 THE TIME REQUIRED TO PROVIDE PAPER COPIES.

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